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# **SPORTS CARS**

50¢ NOVEMBER 1960

**ILLUSTRATED**  
magazine of car and driver

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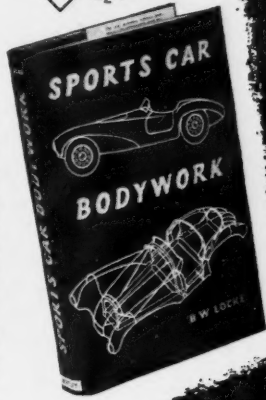


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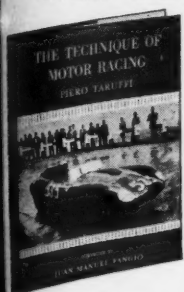
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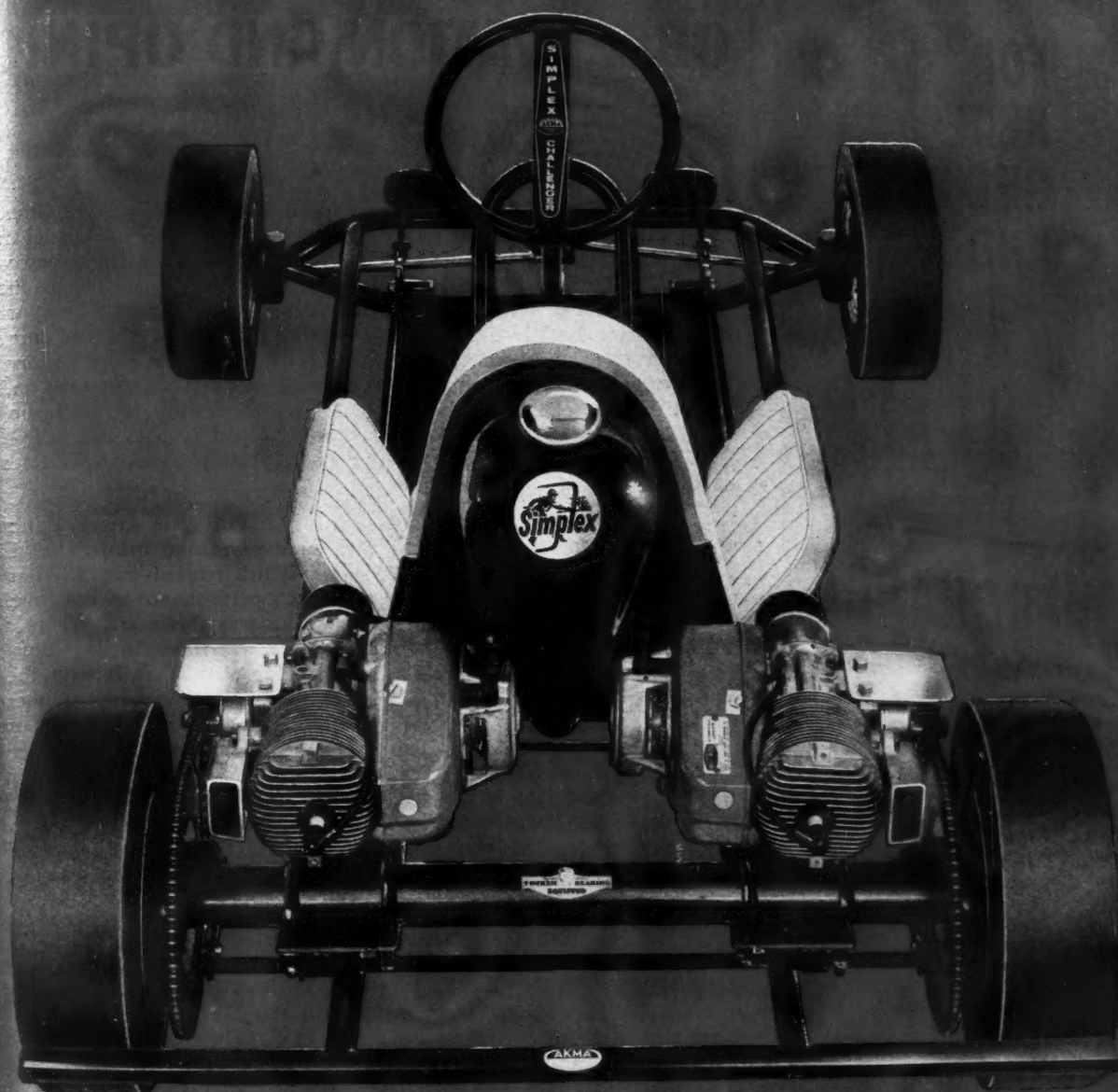
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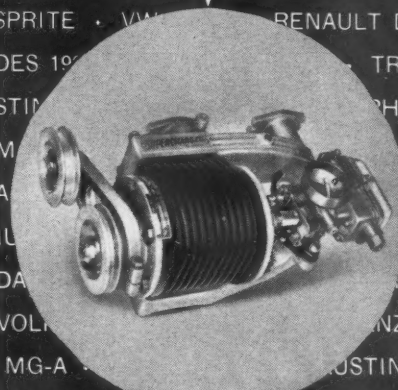
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## OBSERVATION AND OPINION

**HAIL CHAMPION JACK!** — By winning five out of his last five Grand Prix races, The Quiet Australian Jack Brabham wrapped up the maximum number of possible points and clinched the world driving title for the second year in a row. The fourth win was the British G.P., reported on page 68; the fifth one was at the G.P. of Portugal on August 14th. It was far from an easy win. An early lead was held by Dan Gurney, whose B.R.M. failed him and turned the race over to young John Surtees (SCI, September, 1960) whose factory Lotus had set fastest qualifying time. Brabham took over after Surtees's gas tank split at the three-quarter mark. Jack's convincing victories this year leave no doubt that he deserves the Champion title. But next year it looks like he'll have to fight hard for it against the startling Surtees, not to mention a healthy and determined Moss.

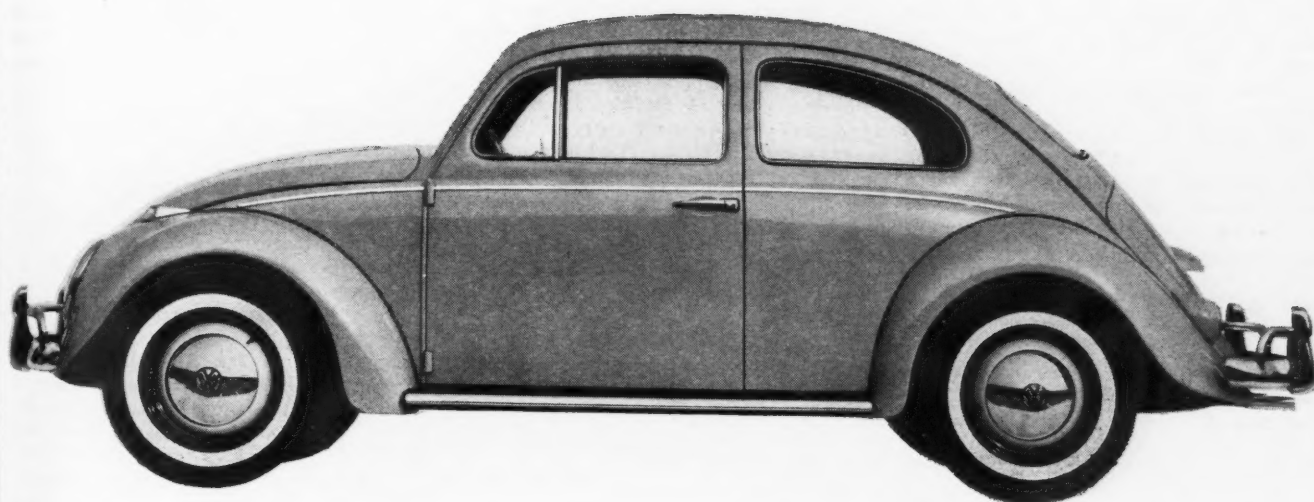
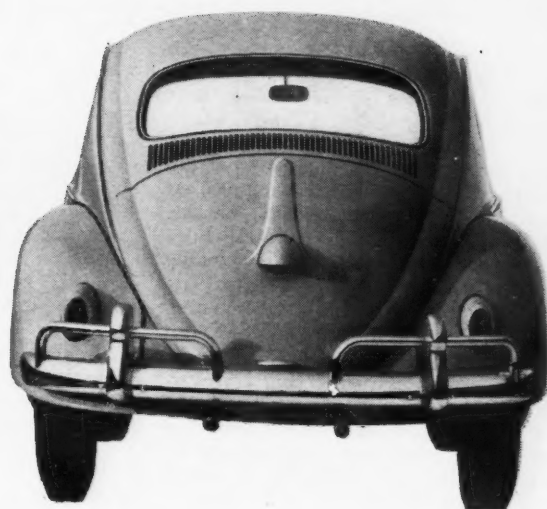
**THE MOSS LUCK** — Where was Stirling at Portugal? After an incredible recuperation he raced and won in Sweden the weekend before, then had his Lotus give out on him in the G.P. event. Which reminds me, SCI was taken to task by one reader for cheering Brabham's performance at the Dutch G.P. with, "... it's about time that luck came his way this year." Where do you get off wishing Brabham luck, challenged Reader, when Stirling Moss is obviously Mr. Most-Jinxed of 1960? Dennis May already dealt with the Moss Jinx in his Brabham profile in SCI for January, 1960, but there's another point that's worth mentioning here. We feel that in 1959 and 1960 Moss rates as the *most fortunate* G.P. driver going! How so? Because by not being a member of a factory team he has incalculable odds against him from the start. No matter how good Rob Walker's stable is — and Alf Francis is certainly a top mechanic — a private team can *never* match the backing and resources available to a factory driver. Last year Moss had to fight factory driver Brabham Cooper-to-Cooper; this year was mixed; next year he'll probably be facing Surtees Lotus-to-Lotus. No doubt about it: it's a credit to Stirling's skill and good fortune that he was even able to stay *near* the factory cars in a privately-owned machine, let alone go after the Championship!

**OUR FINEST TRACK** — On page 72 Dic Van der Feen describes the most truly national sports car race yet held in the U.S. It's significant that the event was held on a track that SCI and most other impartial observers consider the best in this country and among the world's finest: Road America at Elkhart Lake, Wisconsin. We have many good tracks in this country now — more and more as sports car racing snowballs in popularity — but not one deserves a premier international G.P. or sports car race, on a basis of plain merit as a track, more than Road America. Why hasn't its management fought to get either the American Grand Prize or the twelve-hour sports car race? Because, as an R.A. spokesman put it, "Road America definitely doesn't want to 'cut in' on anyone's province (i.e., Sebring). If a proposition should be put forth elsewhere, suggesting or recommending that Road America become an international site, it would receive our hearty endorsement. We're enthusiastic about such a possibility, but just don't want to go out and take something away from anyone."

Road America, a recommendation is hereby made that your excellent track be made the site of either of our star events, and that you do your darnedest to bring this to pass. Racing fans the world over will be grateful. Speaking of our Grand Prize, which we're delighted to see migrate to Riverside this year, we hope the premature settlement of the Championship won't keep it from being held, as almost happened at Sebring in 1959.

**BONUS NEXT MONTH** — In December's SCI you'll visit the Kremlin by 300SL with famed photographer David Douglas Duncan; you'll examine the only *new* Bugatti with Ken Purdy; you'll study the just-released 1961 Corvette in a complete Road Research Report, and you'll get a fresh look at two of the greatest sports cars: Allard J2X and Squire X-101. To top it off there's a special book section by Charles Jarrott and Tony Brooks, spanning sixty years of road racing. In short, the kind of package SCI gift-wraps for your enjoyment every Christmas. Don't miss it!

—Karl Ludvigsen



## Do you think the Volkswagen is homely?

The Volkswagen was designed from the inside out.

Every line is a result of function. The snub nose cuts down wind resistance. The body lines hug the interior workings. Nothing protrudes.

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funny," he said, "how she grows on you. At first you think she's the homeliest thing you ever saw. But pretty soon you get to love her shape. And after awhile, no other car looks right."

The VW defies obsolescence. You can hardly tell the doughty shape of a 1950 model from a '60. To suggest altering it is heresy to owners. (Would you change the

perfect form of an egg?)

But we continually make changes you cannot see. Example: new synchromesh first gear; you now shift into low without stopping. Over a thousand such changes since 1950, but never in the basic design.



Is the Volkswagen homely? It depends on how you look at it (and how long).

# LETTERS

## OPEN LETTER

*The following is an open letter to the Board of Directors of the Lime Rock Corporation, Lime Rock, Connecticut.*

With great reluctance and personal disappointment I am obliged to announce my disassociation from the present management of the auto racing facility at Lime Rock Park, Connecticut, for the reason that I cannot conscientiously be a part of the activities which you are planning to conduct because I consider them unsound and dangerous.

Despite assurances to the contrary, during the past months I have not been permitted to participate in decisions regarding events to be conducted and policies in connection therewith. Certain decisions have been made without my consent which make it necessary for me now to write you this letter.

Events which I had prepared and scheduled have been cancelled for no apparent reason or so modified as to defeat their purpose. As an example, I point out the Little Le Mans event where regulations were greatly changed, to the dismay of the regular participants.

My purpose has been and still is to adequately finance and expand the Lime Rock facilities, to put Lime Rock on a sound financial footing regardless of who subsequently holds the stock majority; in particular, to create a working research center by means of the addition of a high speed test track. Offers to bring this about have been voted down by the present management. I want everyone to know, however, that I still hope to realize plans for refinancing and improving the Lime Rock facilities and believe it is possible if the stockholders and directors would recognize that the plans which I developed are best for all concerned.

If possible, I will continue those personal activities which would be unaffected by my withdrawal from any responsibilities of a managerial nature, i.e., research, testing, advertising, photography and my driving school. If this is not possible at Lime Rock I will conduct these activities elsewhere.

Again, it is with the greatest regret that I write this but I hope that my friends will understand and will continue to visit me at Lime Rock.

John Fitch  
Lime Rock, Connecticut

## THE QUEST FOR ACCURACY

I would like to submit a correction to the excellent "Target Speed 500!" article by Harry Mundy (September, 1960) which states that Sir Malcolm Campbell was the only man to hold both the land and water speed records simultaneously.

Actually, Sir Malcolm was the second and one of two men to share that distinction. First was high-speed rival, Sir Henry

Segrave who set a land speed record in his Golden Arrow and water record in Miss England.

Segrave's records were both set in 1929 while Campbell made his final land speed mark in 1935 and the water speed record three years later.

Incidentally, both men were knighted for their speed exploits, another goal for which Donald may be shooting.

William R. Tuthill  
Director  
Museum of Speed  
Daytona Beach, Florida

*Our thanks to Mr. Tuthill for setting us straight on this point. Another discrepancy crept into the story too, however. We said that Sir Malcolm had set his first land speed record in 1924 at the age of 39, the age his son has now achieved. Later, we said the name "Bluebird" had originated in 1911 when Sir Malcolm so christened a Darracq with which he broke the land speed record at Brooklands. The latter statement is correct as far as the naming of the car is concerned, but according to our files, Sir Malcolm's name first appeared on the land speed record roles in 1924 when he went 146 mph in a Sunbeam. We have no record of his breaking the land speed mark at Brooklands in 1911.*

## ANZAC ENTHUSIAST

I would like you to publish my address as I am very interested in corresponding with a fellow sports or sedan car racing driver or enthusiast. I am 21 years old and I race a Simca Aronde 1300 in road course and drag events. I am also interested in obtaining some decals for my car similar to those seen on Indy cars. Congratulations to the best sports car magazine in the world.

John W. Dymand  
68 Norfolk Street  
Dunedin S.2  
New Zealand

## THE SCARABS IN EUROPE

... European race followers are bitterly disappointed that the Scarabs have had to withdraw from the fray. It is all too easy to scoff, but we cannot afford to in these days when any well-prepared new team of G.P. cars adds to the lustre of the greatest of all sports, to the tune of hundreds of extra spectators. Nevertheless, I think you boobed with the undeniably attractive March cover—fortune-telling is an unwise practice, especially in motor racing. . . .

Mike Doodson  
Cambridge, England

*Our March cover showed an artist's interpretation of a Scarab G.P. car leading the field . . . we still have hopes of its being realized. . . . maybe at the American G.P. in November.*

## UNRAVELING THE JAGS

Your road test of the Jaguar 3.8 hit the spot. It was excellently done and as the owner of a Mark 2, I quite agree it's lots of fun to drive. I am, however, somewhat confused by statements in your article and others and by inferences in the several full-page advertisements published by Jaguar (N.Y.) in the past several months.

All references are that the 3.8 has re-

placed the 3.4 in 1960 and that any one who wants a 3.4 must get the older style car with less glass area, etc. and that it will be a Mark 1.

I have just returned from two years in France. I owned a 1959 3.4 which was quite satisfactory in most every respect. Last fall, at the Paris Auto Show, Jaguar announced its 1960 line of light or sports sedans. These were all to be known as model Mark 2. They would be furnished with the 2.4, 3.4 or 3.8 engines. The 3.8 was to be furnished with a limited slip differential. The usual choice of manual or automatic shift was offered and so on.

The point is—I have a 1960 Jaguar (having found several features which were a marked improvement over my 1959 model). My car has a 3.4 engine; it has all the body and mechanical features of the 3.8 as you describe, except for the engine and differential. It says "MK 2" on the "luggage boot."

Can it possibly be that so many people are being misinformed, or is it possible that Jaguar is exporting (to the U.S.) only cars with the 3.8 engine?

Col. Fred B. Westervelt  
Charlottesville, Virginia

*To answer both your questions at once: yes. Yes, many are misinformed about the Mk 2, 3.8, 3.4, 2.4 designations and, yes, according to Jaguar dealers here, only the 3.8 is being imported into the U.S. The 3.8, we're told, is available at \$3667 (stick shift) and \$3836 (automatic); the 3.4 is available for European delivery at a base price of \$3447 and we were unable to get a price quotation on the 2.4. They all have the Mk 2 body.*

## AUSTRALIAN VIEWPOINT

I recently received the June issue of your wonderful magazine and was most interested to read Pedr Davis's article "Motor-ing Down Under."

While being true in most respects, Mr. Davis left out several points in his GMH story, like the average Australian's opinion of GM and how the Holden is not a good proposition at all from the average buyer's point of view. BMC is certainly racing ahead, and with the advent of the Ford Falcon on our roads in October, GMH will have to start producing good cars.

Short mention was made of the Buckle sport coupe, but this ball of fire would leave quite a lot of cars, including the Chev Corvette and Porsche, for dead in performance, seeing that it has a top speed of 132 mph, costs about half the price of a Porsche, and is powered by a Ford Zephyr engine.

It is indeed unfortunate that, by virtue of our small population and distance from large countries, auto sport here is a little dead, because we have one of the ten best racing tracks in the world, Bathurst, and others are under construction.

The Ascort, mentioned in Mr. Davis's article, is not at all popular and I believe that there is only one in Sydney at the moment. I get SCI every month and enjoy reading it very much.

Anthony M. Stinson  
Antarmon, NSW, Australia  
(Continued on Page 8)

Born Yesterday,  
a classic today:

# FACELLIA

## BY FACEL VEGA

The new Facel Vega *Facellia* is for the man who wants everything in an automobile: the high performance of a sports car, the luxuries and conveniences of a touring car. *Facellia* is France's new favorite. *Coachwork and appointments are as fine as Facel Vega can make them.* Equipment includes a 1600 cc. Facel Vega engine with double overhead camshafts, Pont-a-Mousson 4-speed synchromesh silent gear box, Dunlop racing disc brakes on all four wheels. All trim is stainless steel. Top speed is 114 mph. Now available, in limited quantities, in three body styles: 2/3 seat convertible, convertible hardtop and 2/4 seat fixed head coupe.



### SPECIFICATIONS

PRICE: From \$3995 U.S. Ports of Entry. ENGINE: FACEL VEGA 4 cyl. 1600 cc.—twin overhead camshafts—hemispherical cylinder heads—5 crankshaft bearings—B.H.P. 115 at 6400 RPM.—Com-

pression: 9.4:1. TIRES: MICHELIN X 5.90 x 14. BRAKES: Dunlop disc brakes on all 4 wheels. BODY: Unibody construction. 2 doors, pivoting windows in front, with winding windows. 2-speed electric screen wipers. DIMENSIONS: Overall length: 163½ in. Overall width: 64 in. Height (top

on, unloaded) 49½ in. Front track: 51¼ in. Rear track: 51¼ in. Wheelbase 96½ in. Ground clearance: 7 in. Weight: 2180. CAPACITIES: Gasoline: 16 U.S. gal. Oil: 5 qts. Cooling system: 12 qts. SALES, PARTS & SERVICE: Available through authorized Facel Vega dealers Coast to Coast.

FOR THE NAME OF YOUR NEAREST DEALER, WRITE: FACEL VEGA, EXPORT DEPT. 3, 220 E. 42nd STREET, NEW YORK 17, N. Y.



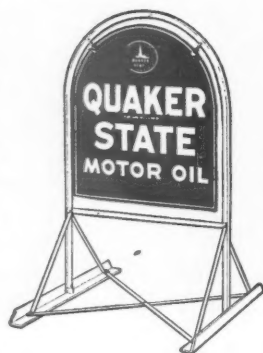
J. D. Eichenberg, of Pittsburgh, Pa., shows the immaculate engine of his 1951 model MG.

## Sports cars run better, last longer with years-ahead Quaker State. Here's proof!

For top performance and surest protection, the world's finest motor oil is Quaker State. Car owners everywhere know it—and J. D. Eichenberg of Pittsburgh, Pa., is one of thousands who can prove it.

The little red sports car above is like new in every way. It has never had a major engine overhaul. It has 43,000 miles on the odometer, and the owner reports that it "still runs perfectly." The answer? "The car has been run on Quaker State Motor Oil for its entire lifetime."

Sports cars, big cars, compact cars—all cars run best



on Quaker State. Refined from 100% pure Pennsylvania Grade Crude Oil, tested in the lab in all kinds of engines—some of them experimental and still secret. Tested again on the track, in

Quaker State's own test fleet. Finally, proved in use by satisfied motorists everywhere. Economical, too—every quart goes farther, helps cut repair bills and helps to keep your car out of the shop. Always ask for Quaker State Motor Oil by name. It's available everywhere. For the name of your nearest dealer, call Western Union and ask for Operator 25.

*Quaker State's Research Laboratories have prepared a technical bulletin on British and European sports cars and passenger cars. For a free copy, just send us your name and address and ask for Bulletin P-952B-11.*

QUAKER STATE OIL REFINING CORPORATION, OIL CITY, PA.

8/SPORTS CARS ILLUSTRATED/NOVEMBER 1960

(Continued from page 6)

### SCORES SCI RACE COVERAGE

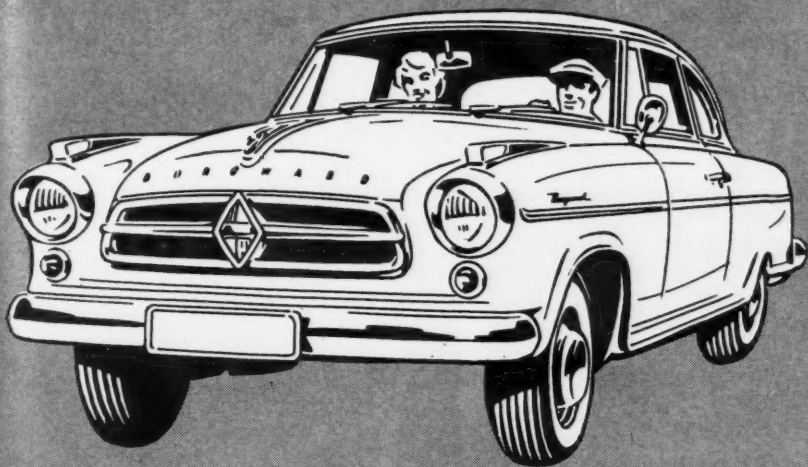
I felt harassment of Alec Ulmann and the town of Sebring had become a thing of the past, but in the July issue of SCI you have rekindled all the old gripes, bitches and complaints. Don't get me wrong, I too dislike the inconvenience, the expense and such associated problems that seem to be present only at Sebring.

But then I have, since my first exposure to Sebring in 1956, had the opportunity of attending racing events at Le Mans, Rheims, Silverstone, Aintree, Brands Hatch, Monaco, Goodwood, Monza and some few in this country not so famous. I can now conclude that these events present the same problems to spectators and competitors alike as does our much-maligned Sebring. For instance at Silverstone, a town of about 500, there is no place to stay, or for that matter even to get a hot meal, yet their International events produce from 100,000 to 120,000 spectators and mere National meetings as many as 60,000. Spectator admissions run about the same as at Sebring with a very important, but often overlooked, exception. The spectator at Sebring who pays \$3 for general admission and \$10 for a paddock pass earns about \$100 to \$150 a week, while his brother enthusiast in England pays \$2.80 general admission and \$8.40 for paddock and probably earns \$30 to \$40 a week. In this respect, I think Sebring is a wonderful bargain. Furthermore, the idea of raising the prices on a race weekend certainly is not original with Sebring; try a weekend at Miami, Palm Springs, Monaco, Rheims, Le Mans or any other area where the income is seasonal or dependent upon a major attraction.

Your report on Riverside also reeked of the cynical, I-wuz-robbed type of attitude. The fact that Jack Brabham qualified a full four seconds faster than the former two-liter record was considered merely respectable. The fact that the winning car was made up of bits from three Camoradi "Birdcages" that had only eight days previously run in the Sebring 12-Hour and the fact that the Nethercutt entry (subsequently driven by yours truly) which had run in all three practice sessions at Sebring, plus over 950 miles in the 12 hours, was taken straight to Riverside, run in the consolation race, and started from 28th on the grid in the main event, to finish third, seemed only worthy of "battle of attrition", and "Shelby took it easy", and "moving up in standings largely through default".

What is happening to our sport? Does it take any less skill to make a car finish a race than it used to? Does it take any less effort on the part of the hundreds of pit crew members? Is the money to buy these exotic cars any easier to come by than it used to be? Does the sound of a 12-cylinder engine at 7800 rpm send less chills up and down your spine than it used to? No, these are not the things that have changed. It is the callous, cynical brainwashing that is taking the toll. You have it in your power to do something about it.

Pete Lovely  
Seattle, Washington



YOU'RE  
LOOKING  
AT  
AN  
ENGINEERING  
MARVEL...

# BORGWARD

## IT'S HEADING FOR 100,000 CAREFREE MILES!

Borgward is fastidiously engineered in the West German tradition...checked, double and triple checked for performance. Among Borgward's many important features: all-steel unitized body, split rear axle, overhead valve engine, coil spring suspension (on all four wheels), wrap-around windshield.



**IT'S AN EASIER CAR TO HANDLE!** Borgward responds beautifully, instantly, to all driving conditions...on the open road, on the track, in the crowded city. Borgward's 3-to-1 steering ratio, and its shorter (102") wheelbase, make parking and maneuvering refreshingly simple.

**IT'S ECONOMICAL FROM START TO FINISH!** Borgward costs about \$1000 less than the comparable West German car of world fame... Borgward matches 95% of that fine car's specifications. Borgward sips, it doesn't drink, gas... It rarely needs servicing. Directionals, heater, cigarette lighter, electric windshield wipers, other "extras" are standard equipment. And, when you get your new Borgward, your present one brings a top trade.

**IT'S AN ALL-AROUND "EVERYMAN" CAR!** Whether you drive for business or for pleasure, whether you're a sedan-man or a sportscar-lover... there's a Borgward model for you. Most Borgwards seat 6 adults comfortably. All are as handsome inside as out. There are no frills... but many thrills to owning and driving this engineering marvel.

Station Wagons, Sedans, Touring Sports, Sport Coupes

Service, parts available at once, coast to coast.

Write for color brochures and dealer names.

**FERGUS** IMPORTED CARS, INC.

*Paul C. Anthony, Inc.*

1717 Broadway (at 54th St.), New York 19, N. Y.

1000 South Hope Street Los Angeles 15, Calif.

# DETROIT NEWSLETTER

►For 1961 our home industry has not merely introduced more "compact" cars to augment the successful Corvair, Falcon and Valiant of 1960; it has revived a car size that makes excellent sense for this continent. In the process the driving public has been presented with advanced engineering features that show just what our designers can do. Last month we covered the remarkable new Pontiac Tempest; this month the aluminum Buick V8 is discussed beginning on page 46, and next month we'll have the full story on American Motors' die-cast aluminum six. This is in line with the SCI policy of supplying you with the technical facts first, then road-testing the cars only after they can be taken off the proving grounds and driven over our standard test circuits. Comparable data and impressions can be obtained in no other way. These two pages will fill you in on detail changes in the Valiant and on the new Dodge Lancer line; on Chevy's new wagons; on the exterior of Pontiac's Tempest, and on clever new engine and transmission designs.

(Continued on page 12)

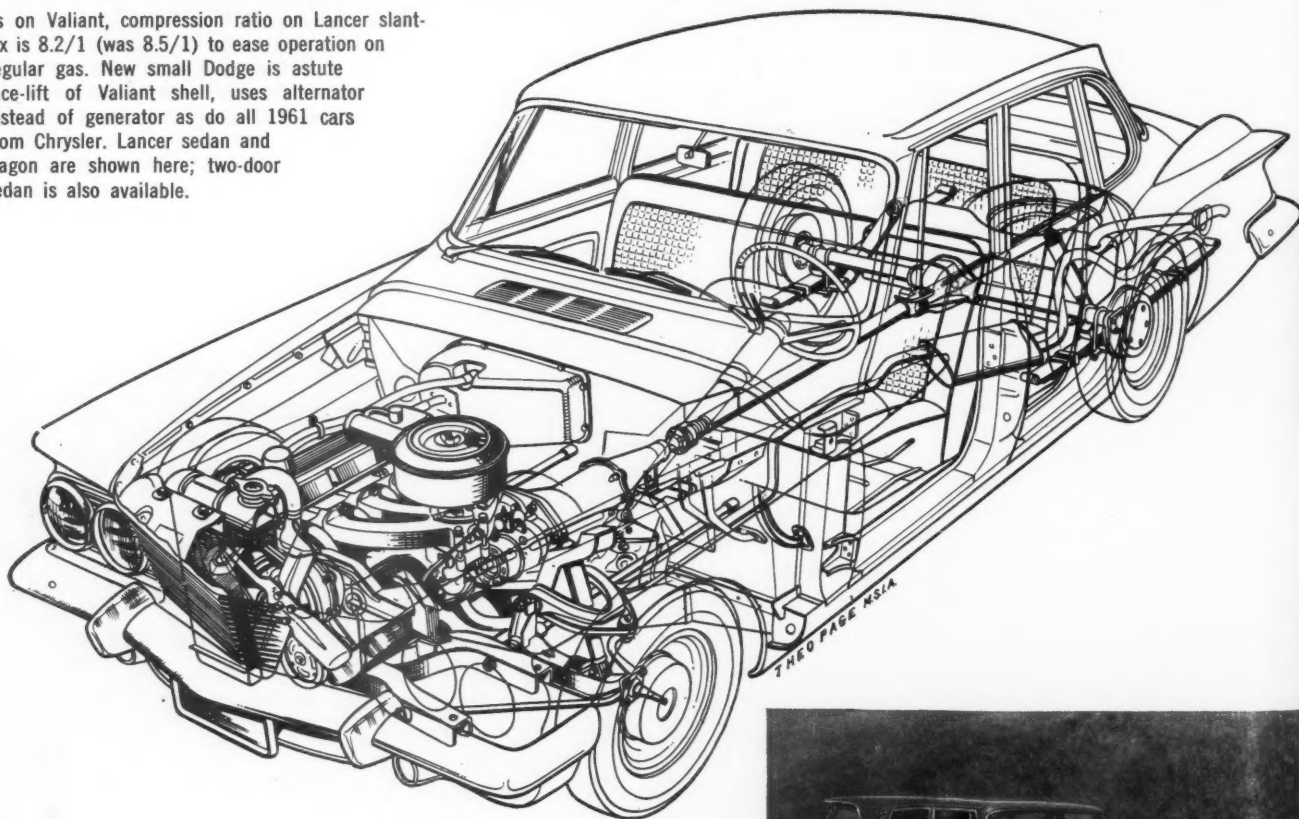


Corvair Greenbrier "Sports Wagon" attacks VW Kombi market head-on. Standard-tune engine uses power pack's heavy-duty bearings, can be mated to 3-speed, 4-speed or automatic box.



Clever standard Corvair wagon stows engine in rear deck. Oil cooler replaces gas burner as source of heater air.

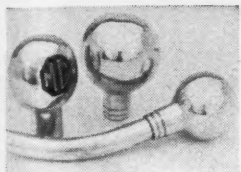
As on Valiant, compression ratio on Lancer slant-six is 8.2/1 (was 8.5/1) to ease operation on regular gas. New small Dodge is astute face-lift of Valiant shell, uses alternator instead of generator as do all 1961 cars from Chrysler. Lancer sedan and wagon are shown here; two-door sedan is also available.



# NIFTY GIFTIES

from **jay's**

Exciting new gift ideas for giving or receiving this Christmas. And remember, at Jay's you must be happy with your purchase or your money back.



## SPARKLING CUSTOM SHIFT KNOBS

Deluxe chrome grip (not adaptable for extensions). Threaded to fit most foreign cars & Corvettes (specify make) \$3.65, polished aluminum knobs \$2.25. Custom CREST knobs for MG, TR, Fiat \$2.50. Gearshift extensions for Porsche, VW, Renault, Jag, Corvette, Valiant \$1.35.



## Jay Exclusive CUSTOM CORVETTE DOOR KNOBS

Add a bit of dash and sparkle to your Corvette with these custom ball door knobs. These deluxe quality, all aluminum knobs are chrome-plated and have threaded insert for easy installation. Replace existing plastic knobs of any Corvette. Only \$2.95 set of 2.

## Drager TIRE GAUGE \$4.95

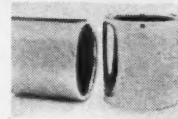


Designed for competition accuracy. Highest quality black anodized aluminum body with adjustable zero dial. Reads lbs per sq. in. and kilos per sq. cm. Includes leatherette case. (Reg. \$6.50) Now only \$4.95.

## TUNE UP WITH UNI- SYN



Multiple carburetor synchronizer. For all multiple carbureted imported cars and Corvairs. A mechanic's right arm and home tuner's assurance. \$9.95. Model 4-B for Carter and Rochester dual 4-bore carbs. \$12.50.



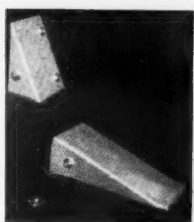
## Corvette EXHAUST TIPS

Sparkling chrome accessory of heavy steel. Tips fit tightly inside exhaust pipe, no rattling; prevents blackening of chrome bumpers. \$3.95 set of 2.



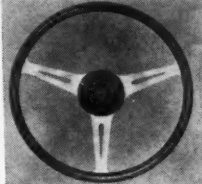
## NEW VW GAS (saver) CAP

You may think you are getting good mileage, but wait until you put on this new, specially designed VW Gas Cap. No more fumes, lost vapors or gas spilled in car or on luggage, etc. Of polished aluminum. Replaces any VW sedan gas cap. Only \$5.95.



## MG-A FRAME COVERS

Protect the interior carpeting from excessive wear and tear with these deluxe patterned aluminum frame covers. A most practical, attractive accessory. Easy to install. (Reg. \$4.95) Christmas Special only \$3.95 per set of 4.



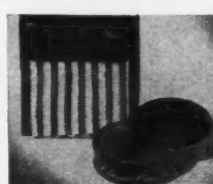
## LeMans Custom STEERING WHEELS . . . \$55

Designed for safety, has rakish appearance. Polished aluminum frame is set off by rich red mahogany rim. No adaptations required, replaces ordinary factory wheel in seconds. Uses standard horn button. Compares with foreign wheels at twice the price. Avail. for: Sprite, Corvair, Healy, MG, & VW. Only \$55. Mercedes, Corvette, Porsche, Alfa, & Jaguar . . . \$60.00 (add \$1 for postage)



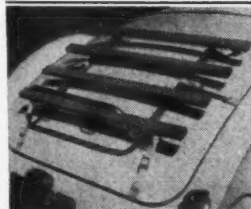
## Grand Prix DRIVING GLOVES

Whether on the track or on the freeways, here is a glove you'll appreciate for years to come. Of fine, soft capekin leather in either tan or black for the most discriminating driver. Hand made, it features double palm, vented back & inset thumb. Sizes: 6 1/2-10. Tan \$7.95; Black \$8.95.



## WAX EXTRAORDINAIRE

Guaranteed Superior! ONE APPLICATION OF Classic Car Wax is GUARANTEED to clean your car; give it a hard, jewel-like finish in 1/2 the time or YOUR MONEY BACK. Plus keeps its shiny protective finish longer than anything you've tried. Just rub it on, dust it off. Includes large 1/2 lb. can, applicator cloth, and plastic case. Only \$3.50 complete.

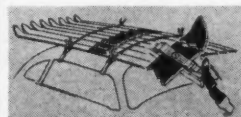


## LUGGAGE RACKS

Engineered to sit firmly, securely, on trunk lid by adjustable straps and rubber coated hooks. Removable! Feature varnished hardwood slats, triple chrome-plated frame. Easy to install, easy to remove. Platform is 20" x 28" supported by 4 suction cups. For MG-A, TR, A-H Now . . . \$19.95. Corvette . . . \$27.50. (Please add \$1 to cover postage.)

## PERMANENT LUGGAGE RACKS

20" x 28", heavy ga. chromed steel . . . \$19.95 (Add \$1 for postage.)



## NEW ECKEL SKI RACK

This is truly one of the finest quality ski racks ever designed. Fits ANY car, ANY top—hard or convertible. Takes only seconds to install. Holds 4 pr. of skis securely. No suction cups. Will not mar top. Only \$14.95.

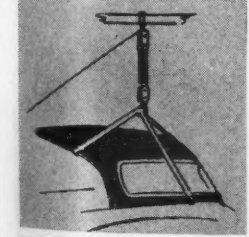


## Jay's Gift Specials



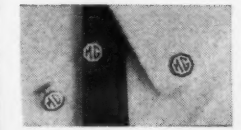
## EMBLEM Party Glasses

A smart touch for your parties with glasses emblazoned with over 40 of your favorite sports car problems. Have them on the bottom. When ordering specify (a) Double Old Fashioned, (b) Swedish Gobbler, (c) or (d) Zombie. Ideal Christmas gift. Set of 4 (reg. \$9.95), now only \$8.95. Matching king-size ashtray or server (reg. \$9.95), now only \$6.95.



## HARDTOP HOIST

This new hoist is simple to operate, requires only a minimum of effort so that you or even your wife can have that hardtop off in seconds. And it keeps it OUT OF THE WAY UNTIL YOU WANT TO USE IT AGAIN. Of sturdy construction. Double pulley system with 30 ft. pull rope. Lifts any make or model hardtop. Only \$8.95.



## CUSTOM JEWELRY

From Europe's finest custom jeweler—exact repro. of your favorite sports car emblem make terrific cuff links & tie bars. Authentic colors set off by dazzling Rhodium-plate. For Alfa, AH, Corvette, Jag, MG, Mercedes, Porsche, & TR. Cuff Links \$4.95, Tie Bar \$2.95.

## KEY FOBS

From England, authentic emblems in jeweler's enamel on rich black Moroccan leather. Avail. for ALL sports cars. \$1.50.

## NEW 1961 CATALOG IS HERE!

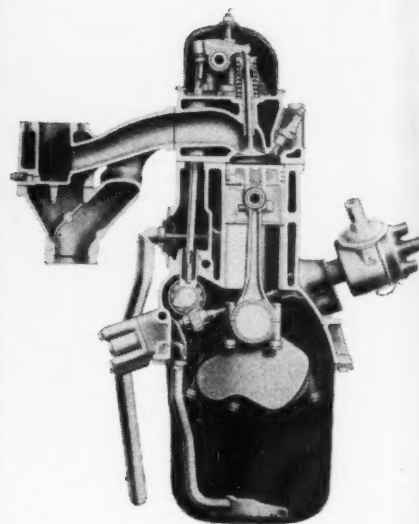
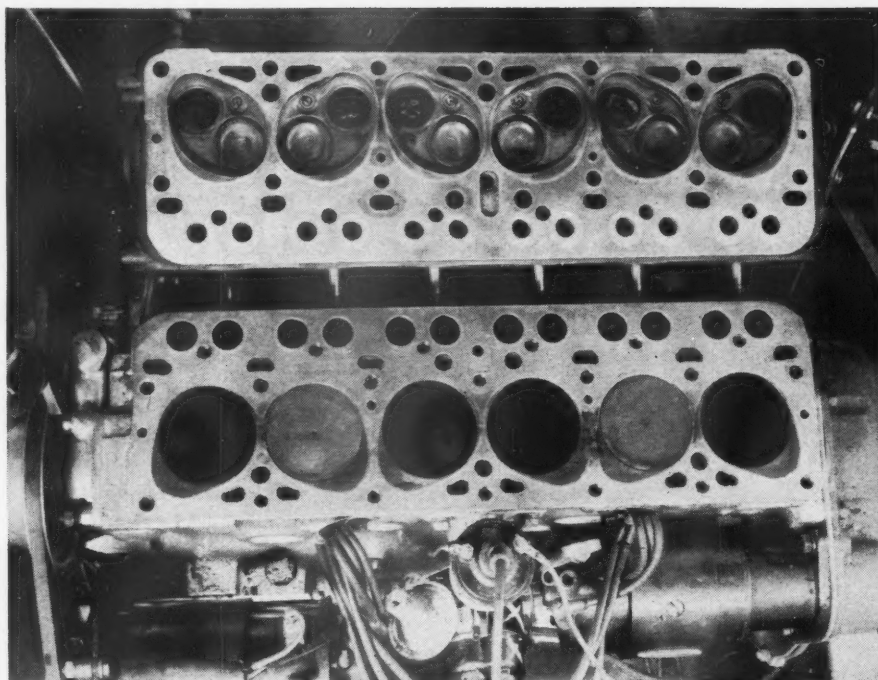
Jam-packed with goodies from near and far. Featuring the latest and BEST buys in foreign and American sports car accessories. Send only \$5. Naturally it is refundable with your first purchase.

## MAIL COUPON

JAY'S SPORTS CAR ACCESSORIES  
6055 1/2 Melrose Ave., Dept. S-11, Hollywood 38, California

QUANT.	PRODUCT	PRICE			Permanent Luggage	
<input type="checkbox"/>	VW Gas Cap	\$5.95	<input type="checkbox"/>	Racks	19.95	
<input type="checkbox"/>	Corvette Door Knobs (2)	2.95	<input type="checkbox"/>	MG-A Frame Covers (4)	3.95	
<input type="checkbox"/>	Corvette Exhaust Tips (2)	3.95	<input type="checkbox"/>	Custom Shift Knobs	3.95	
<input type="checkbox"/>	Key Fobs	1.50	<input type="checkbox"/>	Classic Car Wax	3.50	
<input type="checkbox"/>	Cuff Links	4.95	<input type="checkbox"/>	LeMans Steering Wheel	55.00	
<input type="checkbox"/>	Drager Tire Gauge	4.95	<input type="checkbox"/>	Driving Gloves	7.95	
<input type="checkbox"/>	Uni-Syn	9.95	<input type="checkbox"/>	Hardtop Hoist	7.95	
<input type="checkbox"/>	Uni-Syn for 4-bore carbs	12.50	<input type="checkbox"/>	Eckel Ski Rack	14.95	
<input type="checkbox"/>	Removable Luggage		<input type="checkbox"/>	Emblem Party Glasses	8.95	
<input type="checkbox"/>	Racks	19.95		TOTAL		
Enclosed.....		Cash.....	Check.....		Money	
Order, C.O.D.'s require 1/3 deposit. California res. add 4% state tax. 10-day money back guarantee. Be sure to state size, style, make, and color when applicable. Thank you.						
Name .....						
Address .....						
City & State .....						

(Continued from page 10)

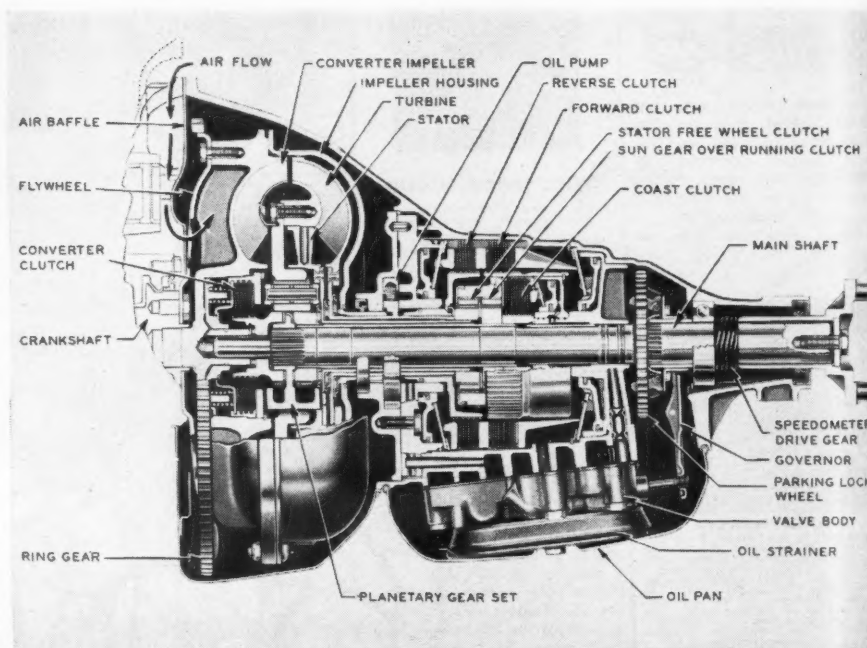


Based on the old L-head design and keeping its 3-by-4-inch dimensions, new Studebaker Lark six has big overhead valves and ports in kidney-shaped chambers. Output of 112 bhp at 4500 is big step from 90 at 4000 of old six. Crankshaft, cam, oil pump and clutch are all redesigned.



1961 Valiant and Lancer lines both include a two-door, clearly based on four-door shell. New Valiant grille has bold egg-crate contour.

All-new automatic gearbox mated to Buick Special V8 has die-cast aluminum case, weighs only 85 pounds. Just one planetary gear set is used, reverse being obtained through turbine. Converter clutch provides semi-direct drive.

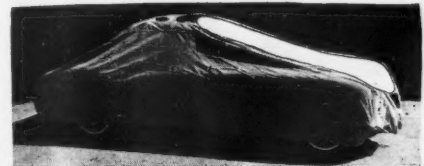


Tempest line includes this four-door and wagon, plus two-door. Pontiac, Buick and Olds "medium-sized" cars share common body structure, actually use identical doors. Big 15-inch wheels enhance car's looks and roadability. New inclined four is impressively vibrationless in operation.



**Marion says:**  
also  
Learn the facts  
about car  
covers.

Hi, there! Most of you are probably familiar with the photo below. It has generally appeared in the lower right hand column of this ad for the past eight years.



The object is a car being protected by an MG MITTEN . . . the original tailored car cover. This was our first product and has been the mainstay of our business. It has often been imitated in the past eight years but has never been equalled. The prices, set in 1954, have not been raised although constant improvements in fabric and workmanship have made the covers more valuable. In that period of time, many firms have approached us with materials which would make the covers cheaper or more profitable. We have tried them and rejected them because they do not meet our critical standards and will not give the service our customers are entitled to. You can buy, from several sources, car covers ranging in price from \$2.95 up. Some utilize the very same fabrics we have refused because they are either harmful to the car's paint or will not stand up under exposure or laundering. (This warning has appeared several times in past columns, you may recall) But, if you have taken our advice, dealt out from month to month, that the best way to keep your car investment safe is to keep the car in top condition, you will not want to jeopardize either the automobile or the sum you pay for a cover by buying an inferior product. Specify an MG MITTEN, either in our special lightweight canvas or DURICON. Look for the MG MITTEN insignia on the cover. Accept no substitute. Our money-back guarantee has stood for eight years. Take advantage of the experience and know-how gained in that time and assure yourself of satisfaction. If your car is not listed below, write for information on a tailored MG MITTEN for your make, year and model.

	Lightweight canvas sun and dust cover	DURICON water repellent
MG Mitten	\$17.95	\$24.50
Healey Hugging		
Triumph Tunic		
Alfa Apron (Spyder)		
Fiat Frock (500-600)		
Sunbeam (Alpine) Snood	ppd	ppd
Jaguar Jacket (120)	\$22.95	\$29.50
Vest for Volkswagen		
Renault Romper (Dauphine)		
Alfa Apron (Coupe)		
Ghia Gown		
Ferrari Frock (250GT)	ppd	ppd
Lancia Laprobe	\$27.95	\$32.50
Porsche Parka		
AC Apron		
Corvette-Corvair Cap		
Jaguar Jacket (140-150, 3.4)		
Mercedes Muff (190, 300SL, 220)	ppd	ppd
300 Sedan	\$27.95	\$32.50
Volvu Vest		

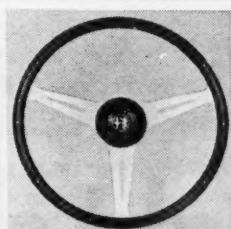


JACKET PATCHES (you name it) .....\$1.00 ea. ppd

#### POST PAID

MG Mitten pays postage on all items except C.O.D. orders.

## "DIG THESE FINE NEW THINGS!"

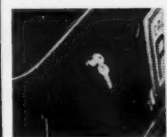


#### CUSTOM STEERING WHEELS for

- ALFA
- CORVAIR
- CORVETTE
- HEALEY
- JAGUAR
- MERCEDES
- MG
- PORSCHE
- SPRITE
- VOLKSWAGEN

Now you can have the custom-made racing-type steering wheel you have admired but felt that you couldn't afford. These 16" aluminum and polished mahogany wheels are crafted in the finest tradition with serrated underside for sure grip. Each has a hub duplicating the original equipment, no adaptors necessary. If your car's wheel has a horn button, you'll find it here as well. Wheels are also dished to match original. In short, the quality is so outstanding you would expect to pay up to \$125.

Prices: Corvair, Healey, MG, \$55.00 ppd  
Sprite, and VW \$60.00 ppd  
Alfa, Corvette, Jaguar, Mercedes, Porsche \$60.00 ppd



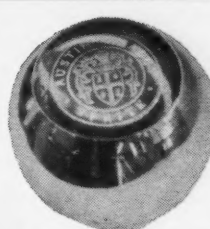
#### MGA DECK LID LOCK

Why run the risk of someone's opening your luggage boot while the car is unattended. Lock it for safety and convenience with an easily-installed Lid Lock. . . \$4.50 ppd



#### BILL COREY AUTOMOTIVE LOCTITE

Is the handiest thing since sliced bread. A dab of this miracle compound locks nuts to bolts, or any metal-to-metal joint to a pre-set torque. Won't vibrate loose but can be broken with a wrench. Every home mechanic needs it. Generous 50-application kit. . . \$1.50 ppd



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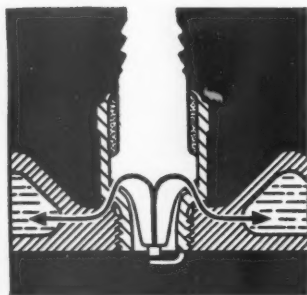
# How to choose the right spark plug "heat range" for racing

In competition—where victory often hinges on a split second—you need the best possible spark plug performance. And that means matching spark plugs as closely as possible to your engine—and to the many factors that affect combustion temperature. Now Champion racing engineers tell you how to do this important job...

How important is selecting the *right* spark plug for a racing engine? Indianapolis drivers and mechanics, for example, consider it so important that they usually spend several days selecting, testing and checking spark plugs to tune their engines for best performance. What they are seeking is the most effective spark plug "heat range." If the "heat range" isn't right—power is lost.

"Heat range" is one of the main factors governing spark plug performance under various conditions. The term "heat range" simply refers to the classification of spark plugs according to their ability to transfer heat from the firing end of the spark plug to the cooling system of the engine.

A plug that transfers heat away from the firing end *slowly*, so that the temperature of the firing end



remains relatively hot, is called a "hot plug." (A "hot plug" does not produce a "hotter" spark.)

A plug that transfers heat away from the firing end *rapidly*, so that the firing end stays relatively cool, (compared to a "hot plug"), is called a "cold plug."

Usually there are several different heat ranges of spark plugs for any particular engine. What you want is a plug that is neither too "hot" nor too "cold" for the conditions affecting the engine. (A plug "just right" under one set of conditions may be too "cold," or too "hot," under other conditions.)

If the plug is too "cold," deposits build up on the insulator nose. These deposits bleed away voltage and can cause a plug to misfire. In severe cases, the plug may not fire at all.

If, however, a plug is too "hot" for the existing conditions, you may encounter preignition. This means that the glowing tip of the insulator ignites the fuel charge *before* the plug actually sparks. This wastes power, and, in most cases, will cause severe engine damage.

CHAMPION SPARK PLUG

The general rule on selecting heat range is this: *the lower the combustion chamber temperatures, the "hotter" the plug should be. As conditions cause combustion chamber temperatures to rise, a "colder" plug is needed.*

There are at least nine factors that have some effect on those temperatures:

**1. COMPRESSION RATIO.** The higher the compression ratio, the higher the combustion chamber temperature — and the "colder" the plug should be.

**2. FUELS AND FUEL BLENDS.** Fuel blends that have special power-producing additives result in higher temperatures and have a lower preignition temperature, and thus demand a "colder" plug.

**3. CARBURETION.** A leaner fuel/air mixture tends to increase temperatures. The leaner the mixture, the "colder" the plug should be.

**4. IGNITION TIMING.** In normal spark advance range, advancing timing increases combustion temperatures, requiring a "colder" plug.

**5. GEAR RATIOS.** Higher gear ratios tend to lug an engine. This subjects spark plugs to higher temperatures, calls for a "colder" plug.

**6. ATMOSPHERIC PRESSURE AND ALTITUDE.** Higher pressures (at lower altitudes) tend to lean out fuel mixture, demanding a "colder" plug. Higher altitudes (lower pressures) call for a "hotter" plug.

**7. SUPERCHARGING.** Supercharging increases effective compression ratio, resulting in increased combustion chamber pressures and temperatures, requiring a "colder" plug.

**8. TYPE OF COMPETITION.** In a drag race you are only on the throttle for a few seconds. The combustion chambers do not have a chance to build up nearly as much heat as they would in a 100-mile sports car race, for example. Thus, with other conditions equal, a car being prepared for a drag race would take a "hotter" plug than the same car being prepared for a long run.

**9. MANIFOLD DESIGN.** This can be a complicating factor. Poor manifold design may cause poor fuel distribution, creating different mixtures in different cylinders. This results in different temperatures in the various cylinders and should be corrected.

Before you try selecting the right heat range for racing, your car must be properly tuned. And, of course, before you can go to a "hotter" or "colder" plug, you need a starting point. You will find it in the "size chart" that your Champion dealer has. This Champion chart gives the recommended "average" spark plug heat range for ordinary use of your engine, not for the extreme conditions of competition.

Suppose the spark plug recommended by the chart is a J-8. For competition, start with a plug one or two

steps colder (J-7 or J-6), depending on your appraisal of the conditions affecting your engine.

*Here's a simple tip for recognizing a "hotter" or "colder" type. Think of the Champion numbering system as a thermometer. The higher the number, the "hotter" the plug. A J-11 is "hotter" than a J-8, but "colder" than a J-12, for instance.*

The next step is to install a set of Champions of the selected heat range for a trial run. Then "read" the plugs' firing ends to see if you need to go a bit "hotter" or "colder."

Here's how to set up the plugs for a reading. If you're going to use the engine for drag competition, make a regular competition-type run. Then cut off the ignition as you cross the line — at peak power. Pull the plugs out there. Do NOT drive back near the starting line or you will wipe out the indications you're looking for. (We'll tell you what to look for in just a moment.)

If you are going into distance competition, make a run for two laps, going as fast as the course will permit. Then quickly shut off the ignition at full power and disengage the clutch. Pull the plugs without doing any more driving.



After a test run, if the insulator nose of the spark plugs shows *slight brown* to *grayish tan* deposits, you have the correct heat range.

If the insulator nose is clean and white — with *no* deposits — the plug is too "hot." Try a "colder" plug.

If the insulator nose has accumulated either dry, black fluffy carbon deposits or wet, oily deposits, the plug is too "cold." Try a "hotter" plug.

Remember — you want a spark plug that is "hot" enough to keep excessive deposits from forming and causing misfire, yet "cold" enough to avoid the danger of going into preignition, which causes power loss and can damage the engine.

And remember — there's a Champion Spark Plug in the heat range that's right for *your* engine — and your kind of driving. That's one reason Champion is the speed world's favorite spark plug.



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# EUROPEAN NEWSLETTER

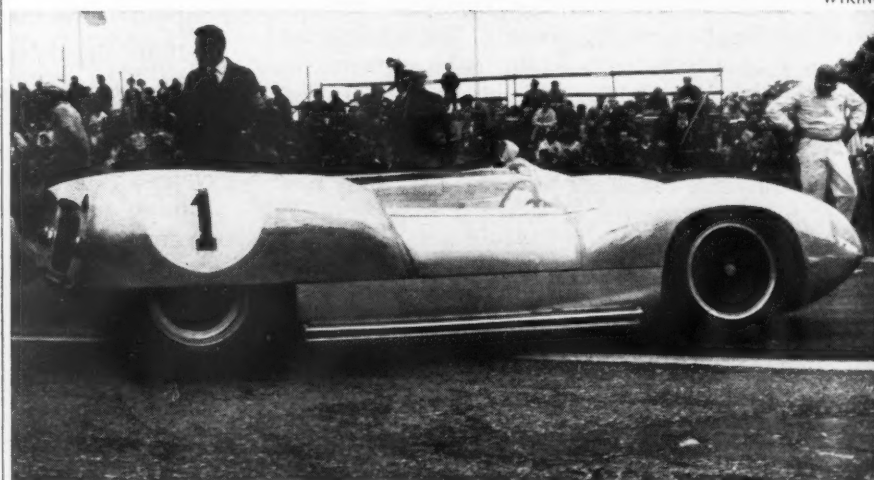
FOTOCARS



## ZAGATO ALFA

Lush curves mark the Alfa Sprint shown here in bodywork by Zagato. Externally, features include retention of the traditional Alfa grille in shape but not detail, deeply-faired headlights, wrap-around windshield and sculptured belt line. A popular Zagato design detail—a double-bubble roof line—has not been employed, and there are no

bumpers on this car meant for fast highway traveling, not city parking. Inside, lightweight upholstered tubular seats, designed to give maximum lateral support, are a highlight. The instrument nacelle is deeply hooded and a near-supine driving position seems in order. Expansive glass areas and sharply sloped hood and trunk lines should give fine visibility.



The new rear-engined 2.5-liter Lotus-Climax won its debut race at the Gelleras circuit in Sweden, driven by Moss who, five weeks after his 140-mph crash at Spa, turned a 103.82 mph lap at Silverstone, .9 seconds faster than the time set by the Cooper Monaco which this resembles, even to its manx tail.

## 1961 VOLKSWAGEN

The wish that Volkswagen owners have been uttering year after year will be granted for 1961—a beetle with more power, more luggage space and a four-speed all-synchromesh transmission—but no styling change.

The official word is that the new VW

will have 40 bhp at 3900 rpm, compared to 36 bhp at 3700 rpm in the current issues. The compression ratio has been boosted from 6.6 to one to 7.0 to one and top speed (a conservative figure, it would seem) is listed at 72 mph compared to the current 68. The Karmann Ghia, by the

(Continued on page 18)

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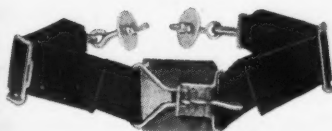
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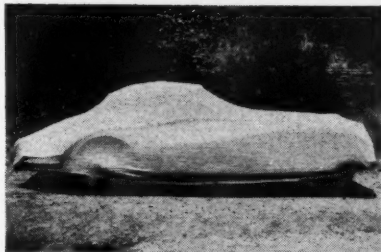


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# DUNLOP

TIRE and RUBBER CORPORATION, Buffalo 5, N. Y.

(Continued from page 16)

way, will share the sedan's use of the transporter engine and is said to have a 75 mph top speed compared to the present factory figure of 72. For the sedan, acceleration from 0 to 50 is 18 seconds, three seconds faster than the present car. The sedan speedometer now reads a maximum of 90 rather than 80.

The engine bears a new carburetor which incorporates an automatic choke and a pre-heat system to prevent carb icing while warming up. The cylinder heads were changed slightly as the compression was hoisted. In the luggage compartment more space is immediately apparent, thanks to a redesigned gas tank. Outwardly, there is no change and on the inside a grab handle and two padded sun visors are standard.

## EVERY OUNCE COUNTS

The bewildering sheaf of rules, regulations, requirements, specifications and indices for the running of Le Mans included an Index of Thermal Efficiency for the second consecutive year this June. This Index is calculated from the average speed for 24 hours, weight of the car and the actual fuel consumption. It is intended to be a means of determining fuel economy progress, since racing is alleged to be directly linked with improving production models. The cars are weighed without fuel, but with oil and water. The list of car weights brought some revealing figures to light since it is often difficult, if not impossible, to secure weights for competition cars. As might be guessed, the Corvettes were the heaviest cars entered and the Lola was the lightest. They checked in at 2990 and 1008 pounds respectively. Between the two extremes, there were some surprising statistics. The weights of some of the cars were as follows:

Corvette	2990 pounds
Triumph TRS	2195 pounds
Jaguar (Cunningham)	2105 pounds
Jaguar (D-Type)	2038 pounds
Aston Martin (DBRI/300)	1926 pounds
Ferrari (with de Dion rear axle)	1893 pounds
Ferrari (with G.P.-type wishbone i.r.s.)	1736 pounds
Maserati (Type 61)	1545 pounds
Porsche (Type RS60)	1322 pounds
Lola	1008 pounds

It's apparent that the Maserati's weight was pared to the minimum. It has 1284 cc more than the Porsche, but outweighs it by only 224 pounds. The Triumph was surprisingly heavy, and weighed about 110 pounds more than last year. The new Jaguar coupled increased power and restyling with more weight than the D-Type, and the Ferraris indicated the difference rear-end layout can have on overall weight.

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# BONNEVILLE NEWSLETTER

by Griff Borgeson

On August 1 Athol Graham of Salt Lake City made his attempt on the Land Speed Record. The previous December he had been clocked at 344 mph and had had problems of wheelspin. In the interim he had made a number of changes in his 1710-cubic-inch, V12 Allison-engined streamliner. He had cleaned up the body admirably. Hoping to improve the traction of the two-wheel drive vehicle, he had locked its differential and, later, had obtained a set of wide-base Halibrand magnesium wheels. Firestone had come up with even better tires with greater contact area than the super Bonneville's Graham had run previously. Before going to the Salt, he had mounted a new wheel and tire assembly on the car's right front spindle and found the clearances satisfactory.

Around 9 a.m. on August 1 all the new wheels and tires were mounted on *The City of Salt Lake*. The left front wheel didn't clear adjacent hardware and torches and grinders were used to correct this. Mickey Thompson chatted with Graham, urging him to take it easy. Graham stated, "I've nothing to learn below 350 mph. I've been there." He was very confident.

I was at the USAC timing stand near the five-mile marker when, at 11:02.54, a voice over the phones said, "He's on his way." I was tape-recording the run and, 47 seconds later, saw the car leap high in the air from its still-hidden position below the horizon. He had gone approximately three miles for an average velocity of about 230 mph; he was doing well over 300 when the accident occurred. The car catapulted and slid for a good half-mile.

Although sped to a hospital, Graham soon succumbed to his injuries, a tragic example of naive enthusiasm tempting a sportsman to go too fast too soon.

Journalists Don Francisco, Bob Russo and I examined the wreckage, then walked every foot of the course involved, recording distances, clearing debris and attempting to analyze what had transpired. Graham's tracks in the salt started out parallel with the straight, black guide-line. Then he began drifting steadily to the left, laying

heavy black marks with a heavy foot on the throttle. The marks said that he didn't lift his foot until, sufficiently sideways, the car flipped.

Race-car builder and Shadoff team member Kent Fuller, sitting at a USAC phone, was the closest eye-witness. He said everything happened so quickly that it was impossible to say which happened first: the flipping of the car or the shedding of its tail section. This section was not very securely anchored and its side area was large. Had the car gone in a straight line the wind load on the tail (previously integral with the rest of the body) would have been relatively slight. But Graham was getting increasingly sideways to the wind and as pressure built up against the flattish side of the tail section, this may have let go suddenly, resulting in an instantaneous, violent change in the car's direction and in an inevitable spin or flip.

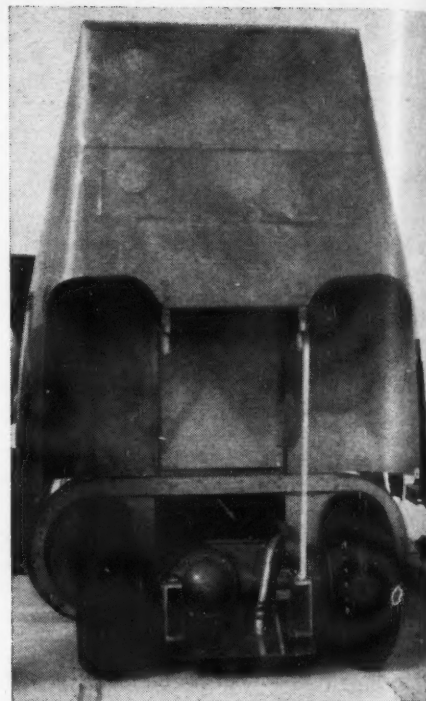
Had Graham lifted his foot early enough all this might have been avoided. But, *à la* early Auto Union, he sat close to the nose of his vehicle, making changes in its direction slow and difficult to detect.

## THE SHADOFF RUNS

The Mal Hooper streamliner, with its shell designed by Dean Batchelor and chassis by Carl Fleischman, was driven by its owner in 1953 to take all the F.I.A. Class C flying-start records from one kilometer to ten miles. Its best speed then was 236.36 mph. The following year small, stolid Bob Bowen drove the car, setting a new Bonneville Nationals two-way record of 248.26 mph. In 1960 the old but fine car, running as the Shadoff Special and prepared and driven by Bowen, went after the F.I.A. records in classes C (183 to 305 cubic inches) and B (305 to 488 cubic inches).

The crew was on hand on August 1, witnessed the Graham accident, assessed the conditions leading up to it and coolly prepared to run early the following morning. The Class C engine was a Plymouth block with dome-chamber Dodge heads and a displacement of only 259 cubic inches: a self-imposed handicap of 46 cubes,  $\frac{3}{4}$  of a liter. The engine was lit, warmed up and Bowen made a familiarization pass northward over the Salt. Well within the hour limit he came back, breaking all the C International records (flying) from one through ten kilometers. The engine ran immaculately, the car ran arrow-straight and Bowen, whose sweat and skill had made the day, emerged with total impassiveness. He had bumped the flying mile record from 236.4 to 252.22 mph according to the USAC clocks.

The Class B engine was installed that afternoon: a 454-cubic-inch Chrysler with C-T Kamboor light alloy heads, set up to run the quarter-mile on 75 percent nitromethane. The morning of August 3 Bowen



Graham's "City of Salt Lake's" tail was held on by small hinge and latches, perhaps too small.

made another two passes over the Salt. The fuel mixture was too hot for the long course and Bowen had to lift his foot midway on each run to save the engine. Further tuning would have improved the car's times but he had broken the flying kilometer, mile, five miles and ten kilometers. He had raised the mile record in International Class B from 268.7 to 273.6 mph. Four runs and nine international records were accepted as an adequate achievement for the year.

## OSTICH HAS PROBLEMS

Nathan Ostich, M.D., his technical supervisor, automotive journalist Ray Brock, and a fine staff of mechanics including Ak Miller were on the Salt on August 5. The car in question was Ostich's *Flying Caduceus*, an open-wheeled, turbojet-engined vehicle with which the 50-year-old medic hoped to go faster than any man in history and to hell with arbitrary definitions of what constitutes an automobile. (see page 30). With 7000 hp at his fingertips, an excellently designed vehicle and fantastic, 48-inch o.d. Firestones good for 600 mph, his chances were good.

The car was barely made ready for the August 5 date and, on the Salt, was plagued by trifling but temporarily-crippling bugs. The field development of the jet car advanced step by step and on the 10th Ostich made a beautiful trial run at 228 mph.

(Continued on page 22)



Bob Bowen set nine new marks in only four runs. The seven-year-old Shadoff Special has raised its "personal" record from 236 in 1953 to 273 mph now.



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**I**n competition, the TR-3 has probably won more awards than any other car you can buy today.

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In short, the qualities which make the TR-3 great for "sports-car drivers" make it great for any kind of driver. See for yourself at your TRIUMPH dealer's. (He's in the Yellow Pages.) There are over 650 dealers from coast to coast. Each is staffed with factory-trained mechanics.

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THE ROMANTICS OF SPORTS CAR SEMANTICS

SERENADE TO SEBRING

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THE RACER LIVES FOREVER

SWINGING AT THE NURBURGRING

A RACING MAN WHO LOVES HIS CAR

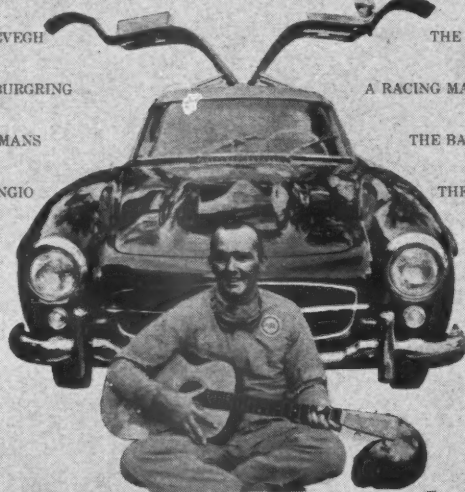
THE COUNTDOWN AT LeMANS

THE BALLAD OF FON PORTAGO

THE TRUTH IS WITH FANGIO

THE BUGATTI BLUE WALTZ

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## SUNG BY PAUL O'SHEA

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### RIVERSIDE RECORDS

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(Continued from page 20)

the big GE engine wailing like all the banshees in the world. Then the starter motor burned out, requiring a day to repair. During a stationary warmup run on the 12th the engine's fiberglass air-intake ducts collapsed due, it was assumed, to engine-created vacuum. This run had been made at 91 percent of takeoff rpm and "experts" passing by stated that this could not have happened at speed, with ram air filling the ducts. The crew slaved all day and night and the following morning the car was ready to go again. Ostich took off, in earnest this time, was on 80 percent throttle at the three-mile mark when two successive pops signalled the recollapse of the ducts. The driver thrust the throttle shut, deployed his 'chute, climbed from the immobilized vehicle with an air of surprising resignation to the facts. A new vehicle requires development. His had not had quite enough time; now he seemed to have isolated the final area of difficulty; he would attempt to correct the fault and try again early in September. To those of us who observed, the car has a fabulous, even terrifying potential. The collapse of the ducts had nothing to do with vacuum but was a result of standing shocks set up by intake air moving at sonic speed. There is much black art connected with the design of efficient ducts for such engines and it remains to be seen whether Ostich will have time this year to find a solution to a problem which appears to be simple but which actually is highly esoteric and complex.

#### SO DOES THOMPSON

The night of August 12 the Mickey Thompson entourage arrived in Wendover, the gourmet's purgatory that lies on the edge of the salt. Thompson was in high spirits, sensing his own impending success. He had slightly rounded the squarish corners of *Challenger I* and had added a GMC 6-71 supercharger to each of his four super-potent Pontiac V8 engines. To accommodate their above-hood projection, he had built a new hood with a pair of huge air-scoops in the form of inverted troughs. These, it seemed, would cancel the car's other refinements in streamlining. They might create new problems of their own by snagging the wind and by creating excessive pressure and/or turbulence in the engine compartment in spite of new vents which had been provided in the car's tail.

There also was the very real question of whether added power would make much difference in this shape's terminal velocity. Last year Mick's problem had been loss of traction in the face of the granite-like wall of air he was pushing in the mid-360s. This year he had come equipped with JATO bottles which he might add to the machine. This disturbed us because you can't turn JATOs off nor can you jettison them.

On August 14 Mick made a run down the Salt in the low 300s, without JATO assist. *Challenger I* was too much of a handful even for this fearless and skilful handler and he suspended his efforts until a new, smoother course could be dragged. Forseeing such a possibility months before Thompson also had reserved the dates August 28 through September 3. At presstime, that was yet to come.

—GB



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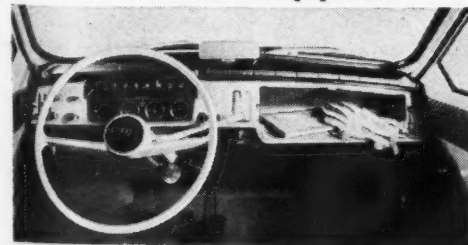
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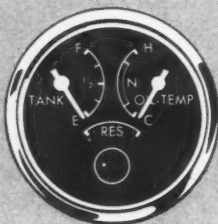
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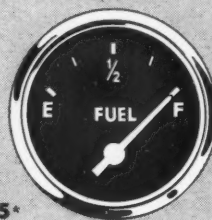
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## PIPELINE

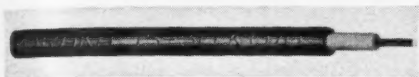
The SCCA National races at Lime Rock on Independence Day can, perhaps, claim the dubious distinction of the Most Bollixed Start of the Year. It was the last race of the day, the one for Formula 3 and Formula Junior machines. The plan was to start the F.3s and follow them with the Juniors as the former came down the hill into the pit straight. Instead, the F.3s were flagged off and were being driven slowly in a pretty tight formation when, as they scarcely got out of sight of the start line, the Juniors thundered off. The chaos in the esses was almost unbelievable as F.3 drivers tried to pick up speed or keep in line. The Juniors passed on the shoulders, through the F.3 pack or backed off. As the first horrendous lap was completed, one of the Juniors hit an F.3 and flipped in front of the timing stand and other cars were damaged but no one was injured. The race was then wisely broken down into two events. George Constantine clinched race five, the event for Modified cars in classes B through G, with a fast ride in the Kelso Chev. He was trailed by Bob Holbert and Roger Penske in RSK Porsches . . . Elsewhere, namely at Meadowdale's SCCA Nationals July 24, Augie Pabst clinched his third straight Scarab first place, dusting off Dick Thompson in the Sting Ray which retired with a blown water pump gasket. There were strong pre-race hopes that the Sting Ray would finally come up with a national win and its performance during the first 30 miles of the hundred-mile event did nothing to dampen those hopes. The winner's average was a sizzling 89.9 mph.

What if your top does leak. Without leaving the house, you can still enjoy the thrill of your car's distinctive exhaust note on records . . . Rosemont Products, Dept. 106, Box 353, Bryn Mawr, Pennsylvania, has a wide range of 45 rpm recordings of cars idling, at speed, and shifting for \$1 each.

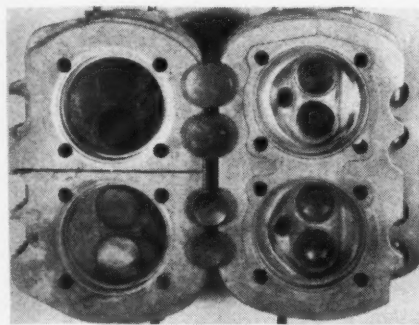
What's it like to set out to attack the world's land speed record? Donald Campbell was recently interviewed by SCI before making his trek to the salt flats. He said, "I never knew what loneliness was until I started this record business." He described record attempts as "scientific, cold, calculating, lonely business . . . underline that word lonely," and compared it to the colorful comradeship found in circuit boat or car racing. Campbell said his first attempt will be to break the existing record by going 400 mph. Why not 500, the car's designed maximum? He answered forthrightly, "Because I want to live. You've got to walk before you can run." Thus, following the pattern he set in his boat record attempts, Campbell will try to increase the top speed of the Bluebird gradually over about five years. Asked if he thought 500 mph was the fastest conceivable speed for an automob-

bile, he said he believed "there is no ultimate to what man might do."

Hailed as the first major exposition in the Rocky Mountain area, the Empire Motor Show will be held in the Denver Coliseum October 14 through 16 . . . Playing the angles, Gopher Karts now features a new king pin inclination said to improve bite on the turns and equalize the load. For more data, contact Gutknecht Enterprises, Nevada, Iowa . . . A Dutch



firm — hold your breath, it's a mouthful — N.V. Hollandsche Draad-en-Kabelfabriek, offers a high-tension cable said to lengthen spark plug life and reduce radio interference. It has a semi-conductive core material and is covered with both a rubber and plastic sheath. For more information, contact the Netherlands Trade Commission, Dept. S, 551 Fifth Ave., New York City . . .



High-compression heads for the Volkswagen, available with 8.5 or 9.5 to 1 ratios, have enlarged intake ports and bigger exhaust valves. Priced at \$300 per set, they're available from Fish Canadian Carburetors, Dept. S, P.O. Box 26, Willowdale, Ontario, Canada . . . Oncoming motorists are alerted to possible danger at night by use of Safety Signal Sticks. They reflect light up to 2000 feet and are said to remain upright in 65-mph winds. They'd make good checkpoint markers for night rallies, too. Priced at \$2.95 each or two for \$5.00, they stand over two feet high and are available from Robert Presentations, Inc., Dept. S, 250 W. 57th Street, New York, 19, New York . . . One of the easiest car care products we've tried is the new "Wax-O" by Simoniz, a water-soluble ( $H_2O$ , remember high school chemistry?) wax. Easy to use, it gave satisfactory results — the car was clean and shiny. It should not however be considered a "wonder drug" for restoring old, faded finishes but rather as a finish maintenance aid. A 16-ounce container sells for \$2.00 — tell 'em SCI sent you . . . Now hear this; hand radio broadcasts up to a mile are possible with the Pocketphone. Measuring  $1\frac{5}{8}$  x  $2\frac{3}{4}$  x  $6\frac{1}{4}$  inches, the transmitter-receiver requires no license to operate. Units cost \$125 each and are manufactured by Globe Electronics, Dept. S, Council Bluffs, Iowa . . . Metzeler tires, which SCI found to be excellent (see BMW 507 road test, December, 1959) are being imported by the Columbia Motor Corp., Dept. S, New York 29, N.Y. The full Metzeler line is available through Columbia dealers.



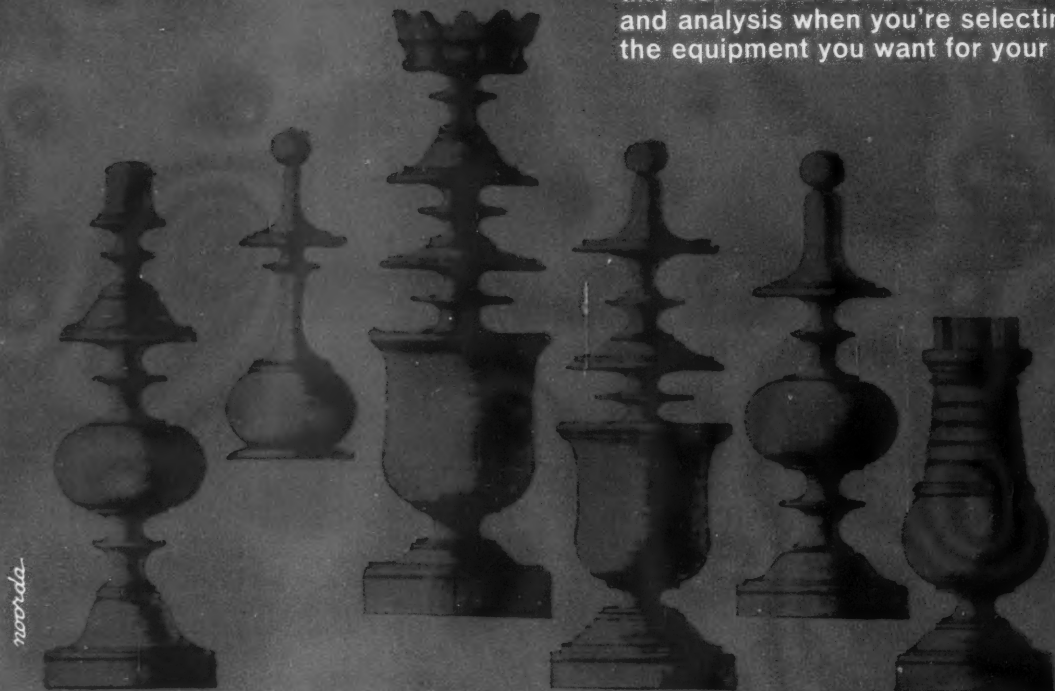
Take it with you — Five-color sports car design fabric is used on this  $15\frac{1}{4}$  x  $14\frac{1}{4}$  x  $3\frac{1}{2}$ -inch overnight suitcase. Priced at \$10, it's one of several items using the same print. These include an arm rest containing a quart vacuum bottle (\$20), a charcoal grill in carrying case (\$20), an insulated cooler (\$12.95) and a travel bar (\$17.95) containing three quart bottles, four aluminum jiggers, four stir rods, a chrome bottle/can opener and spoon/olive fork. Available from U.S. Luggage and Leather Products Co., Dept. S, 29 W. 34th St., New York 1, N.Y. which also has a flamboyantly-curved bulb-type horn at \$17.95 . . . The seventh annual Bahamas Speed Weeks, November 23 through December 5, promises a full bill of racing activity both for sports cars and karts. The 250-mile International Nassau Trophy race is scheduled for December 4.



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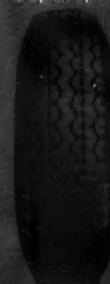
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**SPORTS  
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NOVEMBER 1960

## **BRaille RALLY**

*A unique event vividly demonstrates that the fun and excitement of sports car driving and rallying depends on far more than mere vision.*



A Porsche is clocked in at one of the checkpoints on the 82-mile route of the Tonawanda Touring Club's third annual braille rally for children.



PHOTOGRAPHY: KAMSLER

Deft fingertips scan the instruction sheet prior to the rally's start. Participants were selected by teachers on basis of braille proficiency.

Dr. E. W. Rideout, below left, conceived the idea for the annual event. Happy winners, right, Edward Mott and Doris Lasch pose with their trophy.



► Life without sight need not be a life devoid of color and for the youngsters of the New York State School for the Blind at Batavia, N.Y., who participated in the third annual Tonawanda Touring Club's Blind School Rally, the variegated world of sports cars was presented vividly. The 72 youths, in the fifth through 12th grades, discovered the wide range of often-pleasing contours of many sports and other imported cars and thrilled to the competition of a sports car event.

Youngsters were selected to participate on the basis of their proficiency in braille, as judged by a panel of their teachers, since instructions were written in this form. Significantly, the fun of rallying has spurred the students to greater study efforts. In the first year, several children were unable to go on the rally because they had been haphazard in their braille studies. However, during the 1958-1959 school year, they worked hard and in May, 1959, some 70 youths participated. The superintendent of the school said the desire to go on the rally has provided as much incentive to learn braille as anything they had ever encountered.

In this year's rally, as in those of the past, drivers had no idea of their destination and relied solely on instructions given by their navigators over the 82-mile course. Most of the drivers also handled the timing, but some cars were equipped with watches that could be read by touch as well as sight.

A number of the youngsters found they could distinguish cars by their distinctive sounds as well as touch, and they eagerly await the event each year. The rally was conceived by Dr. E. W. Rideout, of Batavia, a member of the Tonawanda Club. He had planned to present a rally for club members with instructions in braille, but realized sighted navigators would find it too difficult even if they were supplied with a key. The logical step, he decided, would be to set up an event for the children from the school. This was in 1958 and about 60 cars and a like number of students participated. The rally was a typical time-distance type, with timing to the nearest five seconds. The winning navigator was a 12-year-old boy. Trophies were donated by the district Lions Club which also provided victory dinners for the navigators. And a tradition was born.

The 1960 running of the event, which was attended by virtually every high-school student plus some of the younger ones, was won by Doris Lasch, of Wolcott, who navigated



The enthusiastic fifth grade cheering section rooted for their classmates, raising a din that muffled exhaust noises each time a car left.

for Edward Mott, of Albion, in a Porsche. The fourth annual braille rally is scheduled for May, 1961.

As far as we know, this is the only event of its type run in this country and probably in the world. The Tonawanda Touring Club deserves credit for sponsoring it; the Lions rate acclaim for their support and the school directors merit praise for sanctioning it. But the bulk of the plaudits must go to the boys and girls who have demonstrated a determination to develop their specialized skills to participate as fully and as normally as possible in the world they do not see.

—HFW

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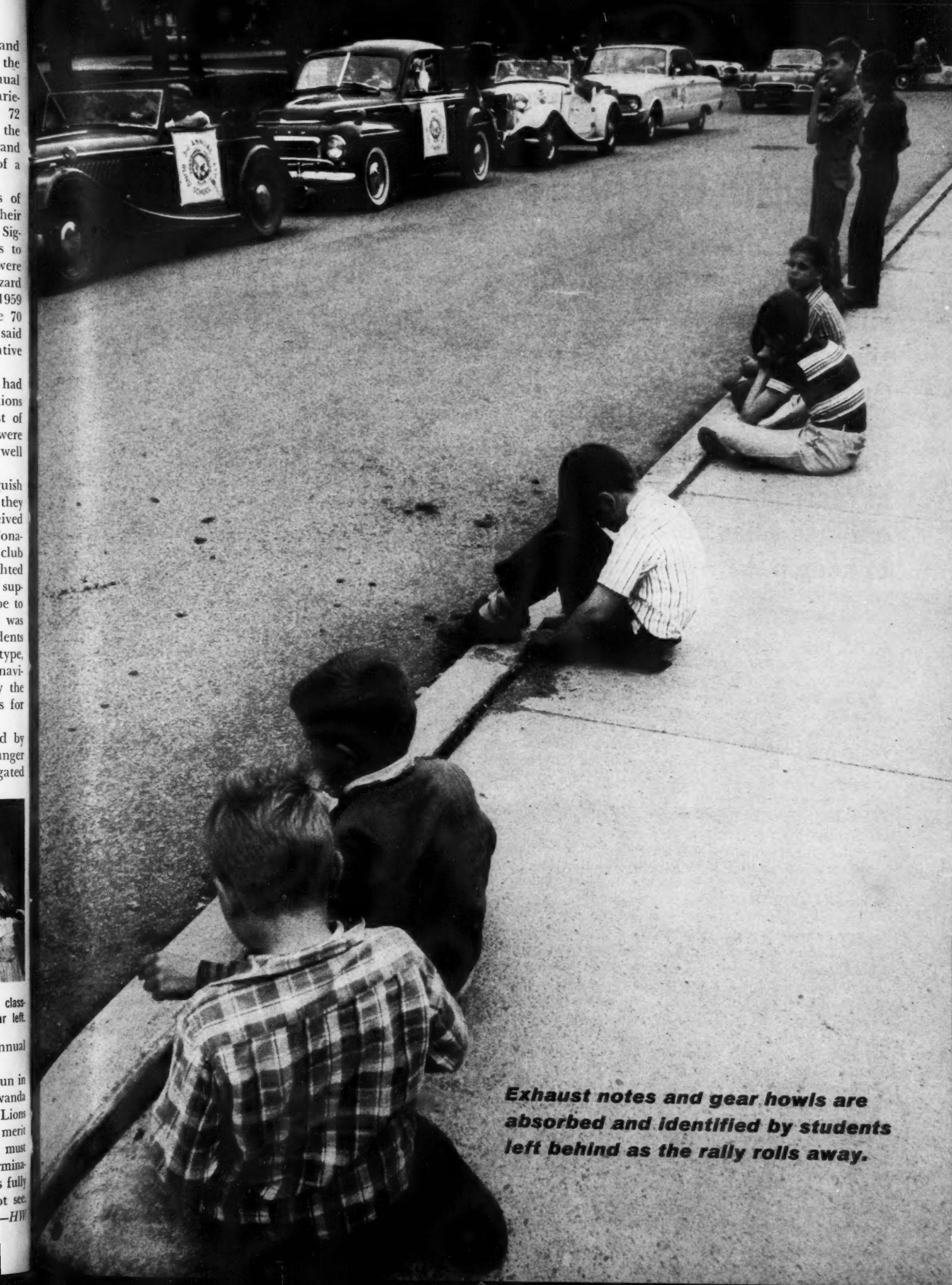
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**Exhaust notes and gear howls are absorbed and identified by students left behind as the rally rolls away.**

# GRIFF BORGESON ON RECORD-BREAKING

**From recent events in the Grand Prix world we know the F.I.A. is due for a drastic shakeup. In a no-punches-pulled Guest Editorial, Contributing Editor Borgeson deals with the sensationally active realm of record-breaking, and outlines what the F.I.A. must do to keep pace with progress.**

► This series of observations would be entirely disjointed without the common denominator of speed. First, let's take the Ostich turbojet record machine.

Article 13 of the F.I.A.'s *Code Sportif International* defines an automobile as "A land vehicle propelled by its own means, running on at least four wheels not aligned [meaning, no doubt, not in a single line], which must always be in contact with the ground [one hopes]; the steering must be assured by at least two of the wheels and the propulsion by at least two of the wheels."

Donald Campbell's "world record holding" turbojet boat did not qualify as a power boat since it was not prop-propelled. Yet it's accepted as the world's fastest. The public is not concerned with torque vs. thrust and if Dr. Ostich goes very fast on four wheels with a turbojet engine, the public will accept that he has a very fast car.

I operate a hobby-type business under the name of World Technical News Service. It began as a voluntary effort to obtain international recognition for American (speed) achievements. Publications all over the world got my coverage for their going rate, always small and often nothing. After a couple of years of seeing this material picked up everywhere I set up W.T.N.S. as a formal, swinging news agency. It continues to be profitless but rewarding, as it was when nearly every important automotive publication this side of the Iron Curtain carried the news of Cal Rice's conquest of the World's Record for acceleration (SCI, May, 1958). Except for W.T.N.S., Rice's achievement would have received notice only at home.

Immediately following the Mickey Thompson records last fall, W.T.N.S. press kits went out all over the world. They were given a big play in most countries, but England granted Mickey only a couple of lines. That an American had broken most of the big, Unlimited Class records either meant nothing or was a fact too unpleasant to dwell upon.

Immediately following the Athol Graham runs last fall, another mailing went out. Graham was then the third-fastest motorist alive. In the British press, this was worth another couple of lines.

The British are interesting competitors. Form and style are terribly important to them. "It's not whether you win or lose, it's how you play the game." The victor in a cricket match makes our "Shucks, 'twarn't nothin'" Western hero a braggart. *That* is cricket.

But in international competition, whether it be the scaling of Everest or the buzzing of Bonneville, it's war. Hillary, Moss or Campbell may come on with the "it really was nothing" manner but they have the comforting knowledge that the Empire and a hearty gaggle of its corporations form the pyramid at the peak of which they sit. Sixty-eight companies are backing Campbell with all-out cooperation and three million dollars in cash.

On the other hand, we have the American approach to record breaking. Thompson had some commercial help; it was a drop in the bucket. The same goes for Ostich. All have created their machines around and out of inexpensive materials that happened to be readily available. They, too, performed with casual form, as though the whole thing were something they just hauled off and did. How true.

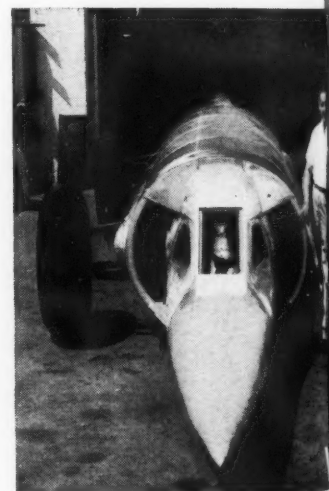
The British are different. The whole nation, government, press and all, takes pride in and supports a man who, like Campbell, is willing to take the big chance. In this country you have to crash and burn to make a line in your hometown paper.

After Dana Fuller broke the Diesel World Record with a GMC 6-71 in a Schapel shell, we went into Wendover and he excitedly phoned the news to GMC top brass back East. The big man said, with clear annoyance, "Well, isn't that nice!" After Athol Graham went 344 I rushed the news to Allison's public relations director and requested technical data on the engine. My letter was never acknowledged.

The British do take their motor sport seriously. This year the men who run the F.I.A. drafted a set of rules for the new Formula 1 that seemed to discriminate against cars that the British were prepared to build. The entire British auto industry stood together solidly in defying and denouncing the F.I.A. They won a concession or two, not enough, and now everyone but the Queen is taking cuts at the venerable body that governs international motor sport.

There is no question that the F.I.A., as the British insist, needs to be renovated in a desperate way. I don't know how ancient is the F.I.A. definition of an automobile which states, among other things, that such a vehicle must be driven through at least two of its at least four wheels. It's definitely older than the age of reaction propulsion, which is the method used by Ostich. Except for this technicality—an admittedly important one, which Campbell's publicity is emphasizing—the Ostich machine conforms to all the other points of the F.I.A. definition.

Let's forget Ostich for the moment and consider another means of propulsion that may become widely used for land vehicles. This is ground-effect or air-cushion propulsion; the



Dr. Nathan Ostich doesn't look too concerned over the F.I.A. ruling his jet car is technically not an "automobile."

SAE calls such vehicles GEMs, for Ground Effect Machines. Automobile manufacturers in America, Europe and Asia are experimenting with this principle; so are American kids, working with kart engines. Builders of "hovercraft" and VTOL (vertical takeoff and landing) aircraft are far advanced in the exploitation of this principle, mating it with high-speed aerodynamics. Riding on a cushion of air would eliminate all of the basic, crucial tire problems that limit

high speeds on land. (For another solution, see page 32.) It also would eliminate the very significant rolling resistance of running gear. The day will come when somebody will show up at Bonneville with a GEM. He may go 1000 mph. Will this be a Land Speed Record? Just what is the deathless truth behind the regulation that a land vehicle, to qualify for the Land Speed Record, must not merely be a land vehicle but also must conform to an arbitrary definition of what makes an automobile?

All right, let's face it: Col. Stapp is the fastest man on land. The whole world knows it. The subtle difference, that everyone also knows, is that he did it on a sled, not on wheels. But when my plasma-drive kart rips through the sonic wall don't tell me I didn't go fast on land.

For his Bonneville runs, Mickey Thompson used a restyled Challenger with covered wheels, scoops over four new GMC superchargers.

I think that the time is at hand for a revision of the rules which govern land speed records. In addition to displacement classes there should be propulsion classes: internal combustion, turboprop, turbojet, ground-effect and electric, in which industry is taking a revived interest. Rocket sleds too, since we're concerned with speed on land, but with the requirement that the vehicle have an occupant and that the occupant be human (apes took over where Col. Stapp wisely got off).

The absolute, Unlimited Record should go to the fastest land vehicle of all, whether it's propelled by rubber bands or by the world's largest electromagnet pulling at the North Pole. Rules that are more restrictive restrict invention. Chet Herbert one day may complete his projected LSR unicycle, a one-wheeled record machine. In doing so he may develop a principle that will rock the vehicular world although, according to present rules, his machine won't be an automobile. Well, the locomotives driven by Malcolm Campbell, Eyston and Cobb weren't exactly what you'd take your girl to the drive-in in, either.

Another thing that galls me is some people's need to justify record breaking. Now we in the sport *know* why and we don't kid ourselves or the public. It's like asking the man why he takes chances trying to climb the world's highest mountain. "Because it's *there*, idiot!"

Now consider this quote from *Bluebird News*, the official organ of the industrial empire that supports Mr. Campbell's record attempt:

#### "HOW WILL 400 MPH-PLUS SPEED ATTEMPT BENEFIT AVERAGE MOTORIST"

"This perhaps can best be answered by quoting Mr. Campbell's father, the late Sir Malcolm Campbell, who in his book, *MY THIRTY YEARS OF SPEED*, wrote: 'The country responsible for the car gains in prestige. It proves the

ability of its craftsmen in the production of material and workmanship which is unsurpassed. The very great amount of research necessary . . . obliges scientists to make quite detailed investigations in metallurgy and streamlining, and to overcome problems of transmission and braking. These problems would not otherwise be set, and the knowledge that their solution brings can be applied to everyday machines.'"

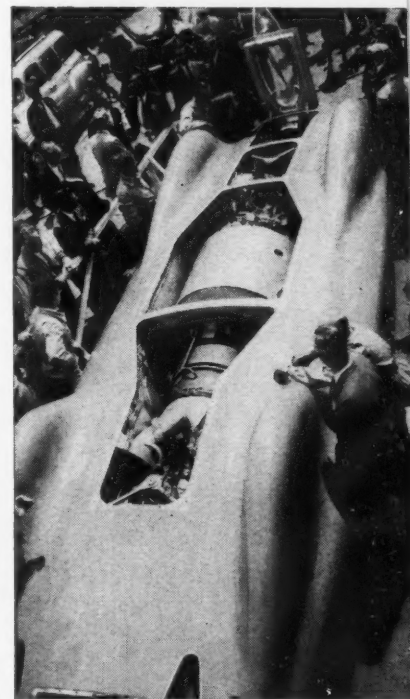
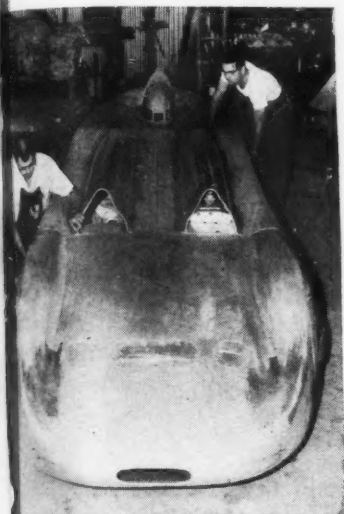
What is important about record breaking is that it is a manifestation of the drive without which life would never have made it out of the primordial slime. Period. Exclamation point.

Another thing that's galling is the cost of running for international records. This is not USAC's fault; USAC makes little if any profit on the cost of hauling its personnel and equipment over vast distances. It can be argued that "international records should be hard to get." They're hard enough to get, without throwing in *this* penalty. Besides, the situation is unfair. When you go to run for international records at Monza, outside of Milan or at Monthéry, outside of Paris, F.I.A. personnel is just naturally around; it's everywhere. In Europe, records are *not* hard to get in this sense. Something has to give. The remedy is so simple and screamingly obvious that if the authorities don't fix it they'll be left wondering which way the action went.

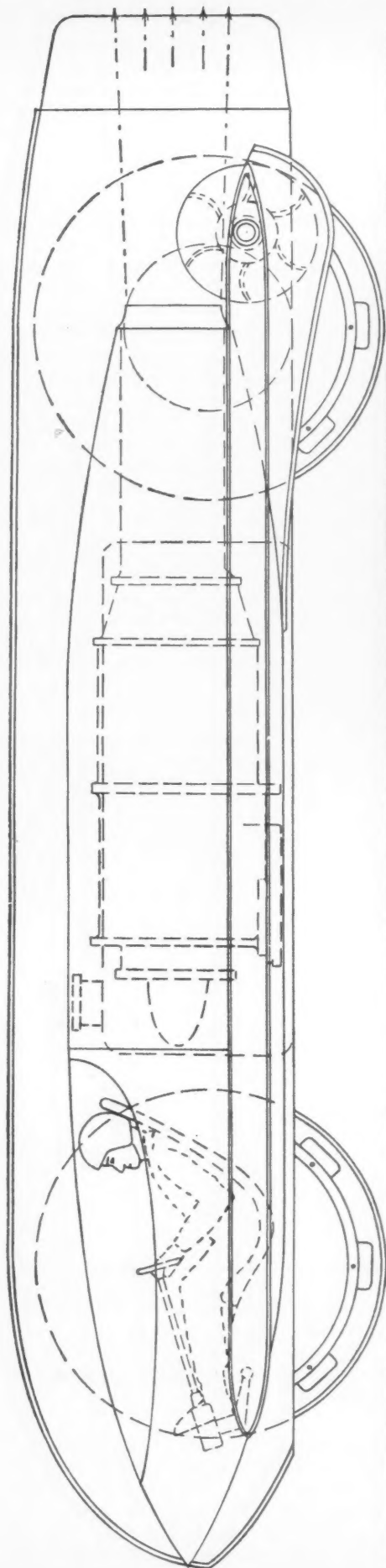
Thanks to the magnificent sport of drag racing we could be setting new international records for acceleration almost every weekend. But this is hard, too. The shortest record distance recognized by the F.I.A. is the kilometer, 3278.9 feet. The only surfaces where you can get a bite and go this distance in relative safety are a very few which belong to the U.S. Air Force. (God bless the USAF, they've bombed the red tape and made March A.F.B. available to qualified speed hobbyists on two historic, successful occasions.) This is far from easy but it, too, could be fixed.

The F.I.A. does not like English linear measure. The F.I.M., which governs international motorcycle racing, already has thrown out record distances which are measured in miles. This makes nothing but sense because most of the world operates on the more sensible, convenient metric system. So let's forget about the F.I.A. recognizing the standing quarter-mile but ask that they recognize the standing half-kilometer. This is 1639.4 feet, only 319 feet longer than the quarter-mile. This would make many drag strips completely suitable courses for international record runs.

I suggested this last year to a European member of the F.I.A. He thought it was one of the greatest ideas since the Jimmy blower and just the sort of thing that was needed to produce, for a change, some positive public relations for the F.I.A. overseas. He was ready to fight for the idea but protocol demanded that it be proposed by a member of the F.I.A.'s American Competition (Continued on page 82)



Most costly of the current LSR contenders is Campbell's \$3 million English-industry-financed Bluebird.



# 700 MPH ON LAND!

by Dieter Korp



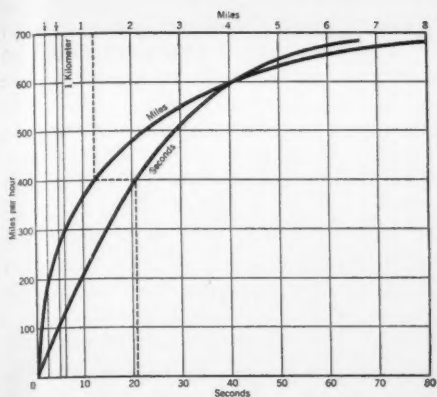
On the preceding two pages Griff Borgeson takes strong issue with the F.I.A. and its antiquated view of record-breaking. Here's a powerful case in point, a design that punches a hole in the regulations big enough to drive this potential record breaker through at nearly the speed of sound.

► "Unlike Reid Railton's design for John Cobb, which depended completely on the short operating life of a land speed record car, a design is presented here which can travel at speeds in excess of 500 mph over long distances — just as soon as suitable highways have been developed." These are the words of a man who is obviously not hampered by a lack of imagination: Austrian-born Leopold F. Schmid, the 49-year-old director of chassis, engine and gearbox design for Porsche in Stuttgart. Since Schmid is an employee of Porsche, the company naturally retains rights to any devices that he may invent and patent, even to this almost incredible, completely original concept of a land speed record contender.

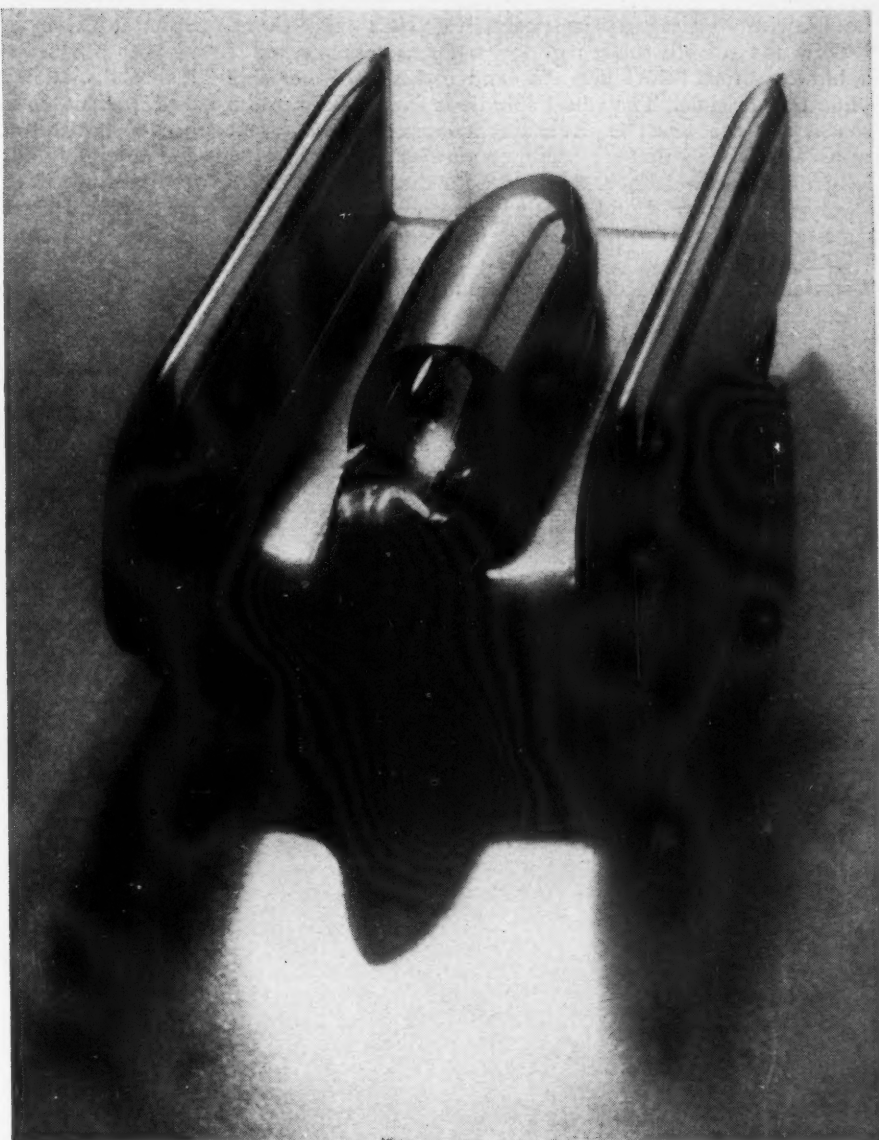
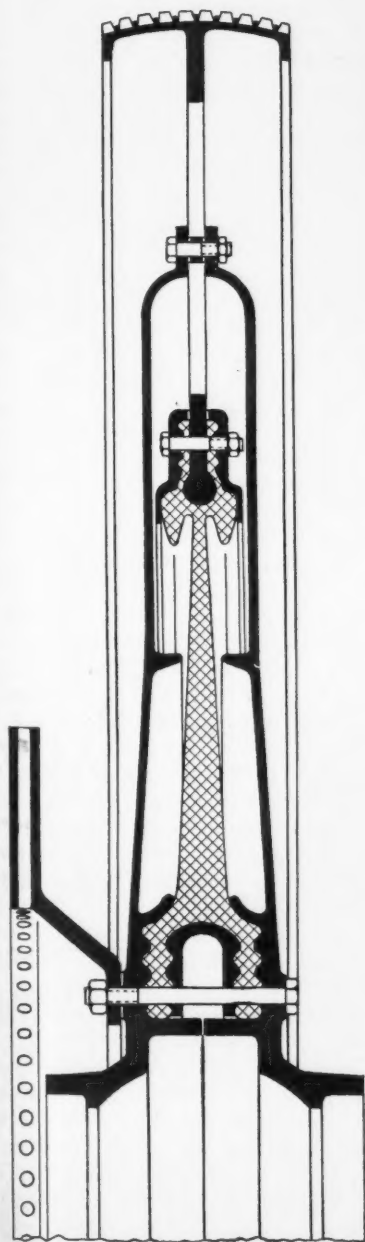
Schmid is by no means unfamiliar with fast machinery. He's the designer of the famous Porsche ring synchromesh system that's been used in Ferrari, Maserati, Mercedes and Vanwall racing cars, and of course has been involved in Porsche's own competition activities. Because Leopold Schmid has been acquainted with quick automobiles, he's come to know what their limits are. His basic outlook is this: what's to be fast should also be simple. Equally, what is simple remains within reasonable and reachable financial limits.

In Schmid's view, only a radical solution to the key problem of tires could open the door to substantially higher maximum speeds. Since the present state of the art doesn't encompass tires suitable for continuous speeds of 500 mph and up, something new was clearly needed. Schmid's solution, already recorded at the German patent office, is such that the tire companies will no longer be able to back land speed record attempts in the usual way. For, instead of a tire, his wheel carries a tread ring made of light alloy, grooved on its outer surface for traction. To keep centrifugal force from tearing the ring away, it's

*(Continued overleaf)*

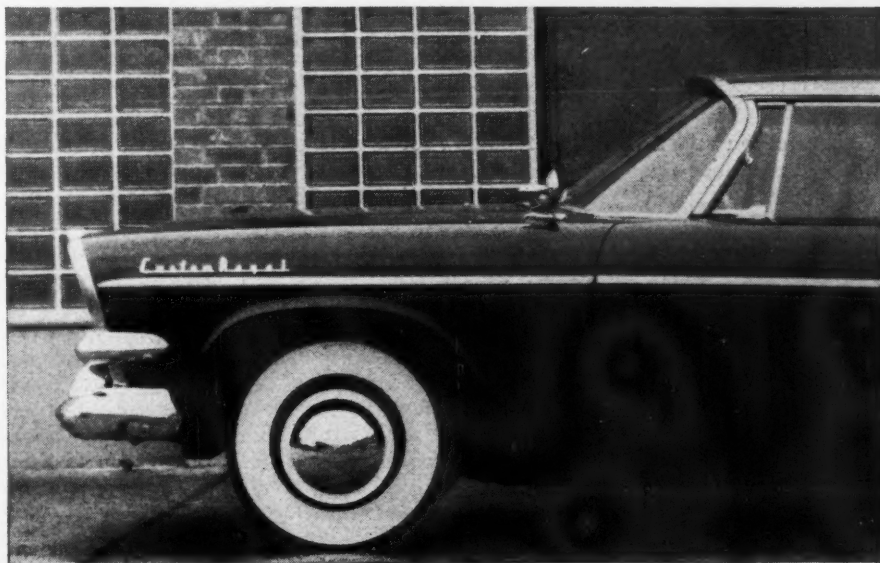


Curve above shows calculated acceleration in terms of both distance and time. The dotted line shows how to read both time and distance to a given speed, 400 mph in this case. With model of car, at left, is designer Leopold F. Schmid. Below is a vertical section of the unique wheel design, with the special rubber springing element marked by cross-hatching.



Will this weirdly-shaped car go 700 miles per hour? Despite its science-fiction styling, it's based on sound, refined engineering by a top designer and may well become the fastest thing on wheels.

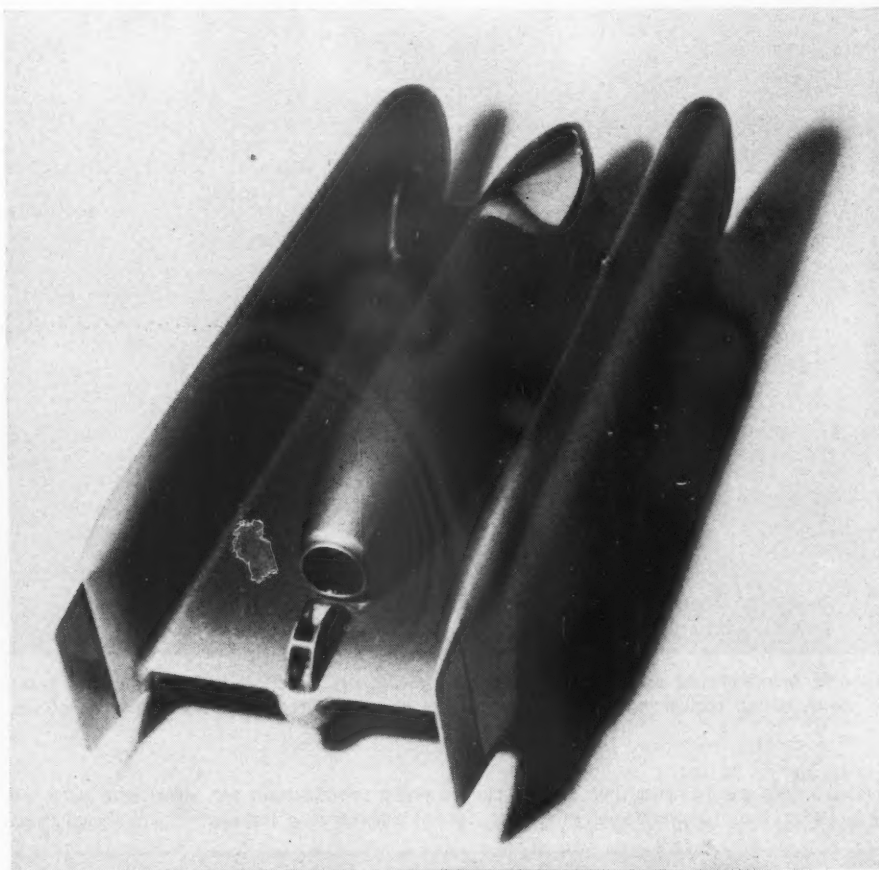
Radical speeds require radical tires and Schmid designed a non-pneumatic one, shown here under test on a Dodge, that's blowout-proof yet retains comfort and handling features of conventional shoes.



bound with a series of spring-steel wires, akin to piano wire.

Only the smooth surface of the salt flats makes possible a blowout-proof "tire" like this, and makes a further simplification feasible. The wheel spindle is fixed solidly to the chassis and the wheel is given a firm but effective internal suspension system that saves money and weight, very especially unsprung weight, and offers a further advantage for a very fast car: tread and wheelbase always stay exactly the same, absolutely no suspension-steering being allowed.

This is the way it works. The central supporting rib of the T-sectioned tread ring doesn't extend all the way in to the wheel hub, but only about half the way. From here in it's bound to the hub by a rubber ring, whose thickness decreases from the hub outward in accord with the decrease in unit stress. A two-part wheel disc surrounds this rubber element and guides the tread ring's central rib on both sides. As set up for this car, this system allows just over 1 inch



Adhering to the letter if not the spirit of the F.I.A. record rules, the Schmid machine has a paddle wheel mounted in the exhaust stream to deliver some 40 percent of the driving power. The rest is pure jet thrust.

of compression and 2 inches of rebound, for a total of  $3\frac{1}{4}$  inches of movement.

Damping of this neat suspension is applied by the two wheel discs where they contact the tread ring rib, in a specific manner not shown in our sectional drawing. The damping is frictional, of course, with the advantage that the rubbing surfaces can be made very large in relation to the masses involved. This large area means that the contact pressures can be kept low, thus ensuring that the suspension is as responsive to small movements as possible. Schmid has already tried out this system (which differs greatly from A.W. Mantzel's rubber-sprung wheel) on an experimental spare wheel replacement that has yielded good results on the road.

A second major problem of the land speed record car, that of propulsion, has also been mastered by the creative

Schmid. Dr. Ostich chose to go all the way to pure jet drive, and it's all the same to him that the F.I.A. won't recognize his results. Campbell stuck to the rules, thus raising the development costs of his car drastically. Since the power needed can only be supplied by a gas turbine, it's only too easy to apply this power by the simplest means: direct thrust. To do this, yet to abide by the letter of F.I.A. law, Schmid has executed a real *tour de force*. About 60 percent of the exhaust stream drives the car by pure reaction energy, while the other 40 percent works against a bucket-type turbine wheel that turns the rear wheels through a shaft and a pair of spur reduction gears.

It needn't be exactly 40 percent to the rear wheels; this can be changed by altering the size of the turbine buckets, depending on the reaction of the F.I.A. committee to this type of drive. Since two wheels are driven, they should be satisfied, especially since even the conservative Campbell's car is still driven by a residual 500 pounds of direct thrust. Schmid's car is designed around a Bristol Orpheus turbine, as is used in Fiat's G91 jet fighter. It weighs only 810 pounds dry.

For braking this *bolide*, Schmid would use discs at all four wheels, augmented by flaps on the left and right hulls that can be swung inward—these being more controllable than a parachute, in his opinion. The car's unusual shape is clearly intended to minimize frontal area, which in fact comes to 17.8 square feet. In spite of the elaborate three-part body, the calculated drag is low: a *C<sub>w</sub>* of about 0.19 is likely. About this, Schmid adds, "The poorer aerodynamic coefficient of this car in relation to that of Railton's car for Cobb (0.19 against 0.15) is caused by the necessary air intakes for the jet engine. Railton avoided the drag of cooling air openings by designing the car for short runs only, carrying ice on board to cool his two piston engines." Wind tunnel tests, so essential to success, have not yet been carried out. How essential are they? Around 560 mph with this car, the first shock waves from the approach to the sound barrier will be forming!

Leopold F. Schmid was the first, apart from Ostich, to recognize that no conventional methods would suffice in going very, very fast. To get the greatest effect with the least possible means, he had to design his car light and simple. Against the 8100 pounds of Cobb's car (Campbell's is even heavier) the planned weight of the Schmid machine is 4300 pounds. The design is technically complete, even if much detail work remains to be done. Schmid's estimate of the cost is far lower than Campbell's: about \$120,000.

Before this project became public, Carlo Abarth of Turin had already signed a contract to undertake the construction of this car together with Pininfarina, but these negotiations collapsed when Abarth refused to identify Schmid as a designer employed by Porsche in the publicity that was being built around the effort. At present, attempts are being made to interest German manufacturers in the design. Porsche would be the logical firm, of course, but Ferry Porsche insists that it's far too ambitious for his "little company". Someone will probably build it, for Schmid's design implies abilities that span far beyond the limited expanse of Bonneville.

-DK

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**HILL NEVER HAD IT EASY** by DENNIS MAY

► The time has passed when fugitives from the B.R.M. team were beating disillusioned retreats out of Bourne at the rate of three or four per season, broadcasting Abandon-hope-all-ye-who-enter warnings for the benefit of the next intake of innocents. Today, a sense of purpose prevails at the sign of the tricolor hot cross bun, and the parent Owen Racing Organisation can flex its muscles without fear of fracturing them. A quietly ardent subscriber to this new spirit is Graham Hill, sole British member of the 1960 team, who shares B.R.M.'s cosmopolitan lineup with Jo Bonnier of Sweden and Californian Dan Gurney—and wouldn't change a thing if he could. "We three," in Groucho Marx's words, "make an ideal couple." Graham's morale, moreover, is unshaken by the remembrance that B.R.M.s of various vintages were tried and usually found wanting by Sommer, Fangio, Gonzalez, Moss, Parnell, Walker, Wharton, Hawthorn, Collins, Brooks, Salvadori, Scott-Brown, Behra, Flockhart, Schell, Mackay Fraser, Fairman, Leston and likely a few more whose names escape me.

Hill says "the cars are beautifully made and prepared, and the organization is very good." Even before the basic B.R.M. architecture was transformed in accordance with current G.P. fashion by putting the engine at the back, the marque had of course scored one *Grande Epreuve* win anyway (Bonnier at Zandvoort, 1959), followed by Moss's second place in the British Grand Prix and other performances with a smell of fair augury. So while it's true that Hill, as he admits, has an optimistic nature, his acceptance of the proffered Owen contract wasn't prompted solely by hope as Shaw defined it, viz., "not knowing the future won't be happier than the present."

Hill/B.R.M. esteem is mutual. Raymond Mays, the Owen stable's racing director, said this about Hill when I discussed the 1960 team composition with him soon after the Argentine G.P.: "Having watched his performance on Lotus last year, and seen his determination to do his best always in all conditions, I felt he was a driver to be reckoned with and to be encouraged. From our experience, I should also regard him as potentially a good team man."

In the preliminaries to the drama called Grand Prix, effective casting depends as much on reading between the lines as along them. In fact, if Mays had confined his scrutiny to the results—as distinct from consequences—attending Graham's efforts on behalf of Team Lotus during 1958 and '59, he would surely have looked elsewhere for the third member of his "ideal couple." Just how profitless a phase of Hill's career this was is shown by an easily-remembered statistic that he quotes with rueful laughs: in two clear seasons, in which he scarcely missed a *Grande Epreuve*, his total take in World Championship terms was one point. This he "amassed" at Monza in the 1958 Italian G.P., where, he recalls, "there was a high mortality rate" and he placed sixth, one from last. Among the many silver cups—some for driving, others for rowing—that crowd the furniture at the Hill flat in Hampstead, London, is the handsome Lotus Trophy; in 1959, the inscription records, it was awarded to Graham Hill, "for the season's best individual performance by a Lotus driver." Unable to recall any '59 success of his that rated such recognition, but chary of hurting his feelings, I diffidently asked him to refresh my memory. He couldn't. "No," he said, contemplating the thing with his head thoughtfully on one side, "I really don't know why I was given that."

When a driver gets the come-hither from a wealthy and potentially world-beating *equipe* like B.R.M., the selection is normally based on recent and tangible successes. Hill, *per contra*, was chosen in spite of recent and assuredly tangible failures, Mays and his Owenite associates having seen with their own eyes how doughtily he dealt with the

handicap of fragile and often relatively slow equipment. With its own bedevilled past as precedent, B.R.M. had had plenty of practice at exonerating and justly evaluating also-ran drivers, and, incidentally, could retrospectively sympathize with Lotus on its 1958/9 engineering afflictions.

If he'd been anything but an obstinate ox, albeit an amiable and rather good-looking one, Graham Hill would doubtlessly have renounced wheelsport in its several forms before the itch to persevere and excel therein became a masterful addiction. Like Dan Gurney, he was attracted in youth to motorcycles, which he rode with no particular success, as far as he remembers, in minor trials and scrambles. That was in 1948 and '49, during an apprenticeship he was serving with S. Smith and Sons, the motor accessory firm. He fell off the first bike he owned, a prewar Velocette, breaking a thigh. The injury confined him to a hospital for four months, set his motor accessory education back a full year, and left him with one leg that was "a bit bent and a bit short." The resulting limp, though slight, is sometimes discernible still.

His apprenticeship completed, Hill did his statutory two-year spell of national service, in the navy, then returned to the Smith company in a paid capacity, working on the development of car heaters and magnetic clutches. At sea he served in cruisers, winding up with the rank of Engine Room Artificer; his ship, he says, was "invariably sunk" during the periodic exercises to which Hill helped to contribute a head of steam, which may have conditioned him philosophically for the many racing DNFs the future had in store for him.

With a short but eventful motorcycling career behind him, and certified as "capable of taking charge of a boiler room while steaming under full power," Graham demonstrated his ability to take charge of the first car he'd ever owned or driven, a prewar Morris Eight, and steaming it under full power, without any previous tutelage. The vendor took his check, told him which pedals did what, and he just motored composedly away. This was in 1953, a little over three years short of a memorable Brands Hatch occasion when he was to break Colin Chapman's own sports car lap record on Colin Chapman's own Lotus.

Up to date, though, he'd never heard of Mr. Chapman, and the Morris didn't survive long enough to kindle Hill's enthusiasm for steaming under full power in competition with other people. A month or two after he bought it, somebody motored into him out of a sideturning and ground the old Eight to splinters. "Gone the merry Morris din," as Keats grieved.

Graham's introduction to the even merrier Cooper din came about quite by chance. One day at the Smith factory he happened to pick up a stray copy of *AUTOSPORT*—he wasn't interested enough to buy his own copies—and his eye caught a small ad with a You-too-can-be-a-speed-king purport. The establishment concerned couldn't and didn't claim to be a school because there weren't any instructional facilities; it was indeed strictly a one-man, one-car outfit. The idea of racing with a wheel in his hands rather than an oar had never crossed Hill's mind before, but it crossed it now. Brands Hatch circuit, about twenty-five miles from Graham's home, was the advertiser's theater of operations. His equipment was an F.3 Cooper-J.A.P. and he charged trainees five shillings per lap to drive it.

Going AWOL from his heaters and magnetic clutches at the first opportunity, cadet Hill turned four laps of Brands on the Cooper, price one pound, and bemusedly admitted to himself this was a sensation that even beat the familiar thrill of stroking the London Rowing Club's Grand Eight at Henley Regatta. Once a week thereafter, further

(Continued on page 86)

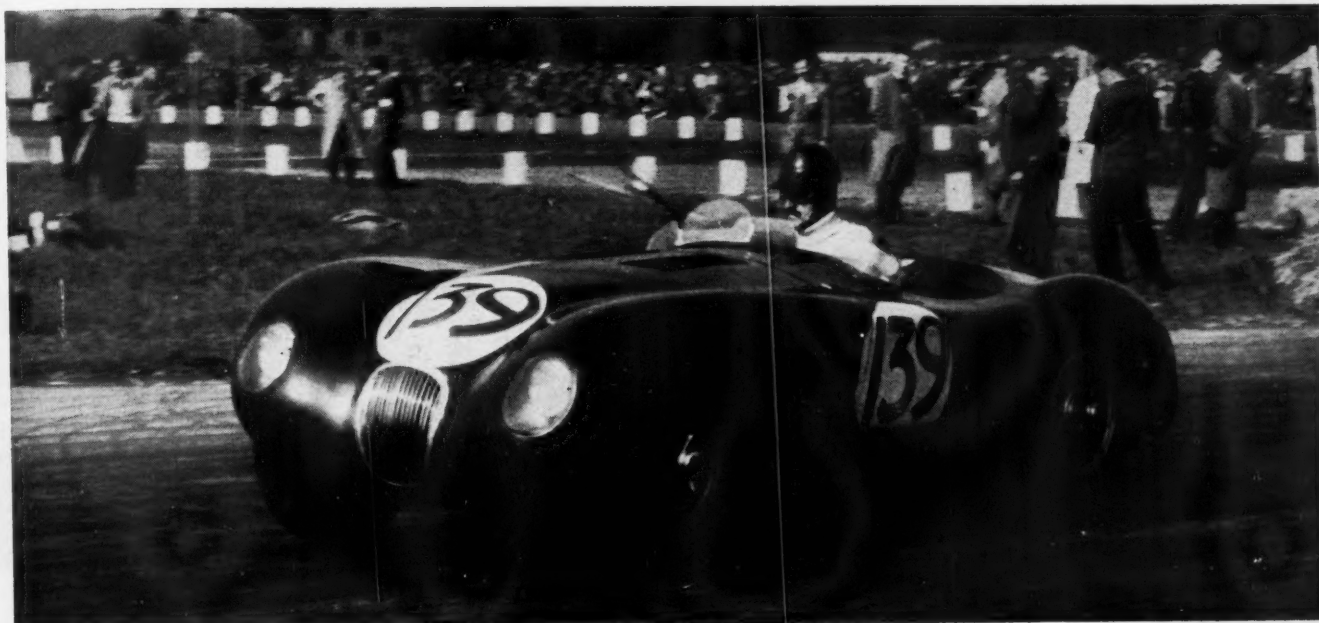


Hill's attractive wife, Bette, wears his crash helmet as he explains a kart's two-pedal driving layout at Brands Hatch. They married in 1955.



BRIERLEY

Though six feet tall and big-framed, Hill's no misfit in the compact B.R.M. Here he tests an early rear-engined type at the Goodwood course.



At Ibsley, a lesser-known English circuit, Graham uncorks the C-Type Jaguar of Dan Margulies after navigating the tight right-hander. It was this year, 1955, that he joined Lotus Engineering as a full-time mechanic after driving a tour of continental and North African races with Margulies and some English races solo. Soon after he became a driver on the Lotus team.

Colin Chapman, Lotus's guiding light, Hill and Juan Fangio fumble a three-way handshake at Monza last year. Last year's season and that of 1958 were tough ones for Lotuses, which suffered from just about every sort of mechanical trouble imaginable. We'd guess this was taken before the start judging by the expression on Hill's face, since car lasted only one lap.



MANNEY



Chev engine in a VW?  
Too tame for Howard  
Hiyama, who built the . . .

# ROARIN' RENAULT

by Bernard Knoll

Walk-in accessibility in the Renault with a roar is evident in this view through the stable door. Shoe-horned Chev more than holds its own in stop light G.P.s.

Hiyama clamps on the binders to decelerate after a scalding 0 to 100 mph run in a scant 10.5 seconds. Car has two speeds forward, but that's plenty.



► Unimpressed with the performance of France's most popular but certainly not most powerful import, a Fowler, California college student decided to buy a Renault Dauphine and give it "a little pep." Owner-builder Howard Hiyama is still wondering what happened to his plan for "just a little" more power, but with a Chevrolet V8 neatly shoehorned into what used to be the back seat, he wound up with a machine which takes a back seat to nothing—especially in acceleration.

The "Roarin' Renault," as friends have tabbed it, has turned over 120 in quarter-mile practice runs and has recorded 0-60 times of 5.1. The clincher is a 10.5-second 0-100 time!

The Renault is as deceptive-looking as it is fast. A slight forward rake, a set of spun aluminum wheel covers and a dash-mounted tach are the only noticeable differences at passenger level. A naugahyde cover will soon hide all but the air cleaners from view.

Plans for the car began to jell while Hiyama, a long-time hot rod and sports car enthusiast, was making his daily jaunt to nearby Fresno State College. He ran into a friend who had just read the Violent VW yarn in the January 1958 issue of SCI and laughingly suggested throwing a big V8 in the back seat of a Renault. Howard was a bit skeptical of the Violent VW setup but curiosity led him to make a check of weights and measurements of the Dauphine and the Chevy engine.

To his surprise he found that with a little squeezing and a little cutting the components would fall together without too much strain. He also surmised that the total weight of

the car would not exceed 1,700 pounds; only 300 pounds over the stock Dauphine.

For his project Howard chose a clean '57 sun-roof, which he picked up at a bargain price.

The engine is a competition-tested '56 model rebuilt by Shig Matsufugi, a talented Chevrolet specialist. Basically it's of 1957 "270" dimensions, with a trio of Stromberg carbs, a reground version of Mr. Duntov's famous cam, revamped Hedman Hedders and a boosted compression ratio.

The transmission, borrowed from a 1948 Mercury, was selected for its sturdiness and the easy availability of parts. A novel innovation is a reverse gear layout in which the handbrake lever serves as a positive lockout to reverse. At present the car has but two speeds forward, which is actually all that is needed in view of the power-to-weight ratio.

First step in the actual construction was to remove the old engine, a very simple task. Next the floor paneling was cut away and the body unbolted and lifted over the new engine-transmission unit for preliminary measurements.

Howard found that the entire power unit intact would leave very little room in the front seat so he decided to extend the wheelbase back 2 inches. The entire rear end unit was repositioned and the fender wells cut away to allow extra room. Later, a little bodywork hid the slightly larger wheel wells.

The next step was to convert the Renault rear end unit for use with the '48 Mercury transmission. (The gearbox had already been mated to the Chev powerplant via a Cragar adaptor.) A nearby machine shop decided that a set of Ford universal joints would do the trick, since the shaft size and spline of the transmission and rear end were exactly the same. The Renault transmission unit was cut away and a facing plate with a bearing was welded to the severed rear end. A bolt through the top of the U-joint and into the pinion shaft locks the setup in place.

This layout gives a final rear end ratio of 4.375—a bit lower than the stock Renault, due to the difference in transmission units.

With the entire power unit bolted up, the body was again lowered over the engine to make final checks. A front cross-member and four braces to help bolster the Renault frame were fashioned. A firewall was cut out of sheet aluminum, as was a cooling duct which supplies fresh air to the Nash radiator squatting in the old engine compartment. The cooling system utilizes 2¼-inch flexible exhaust tubing which runs from the water intake to the rear-mounted radiator. No fan is used.

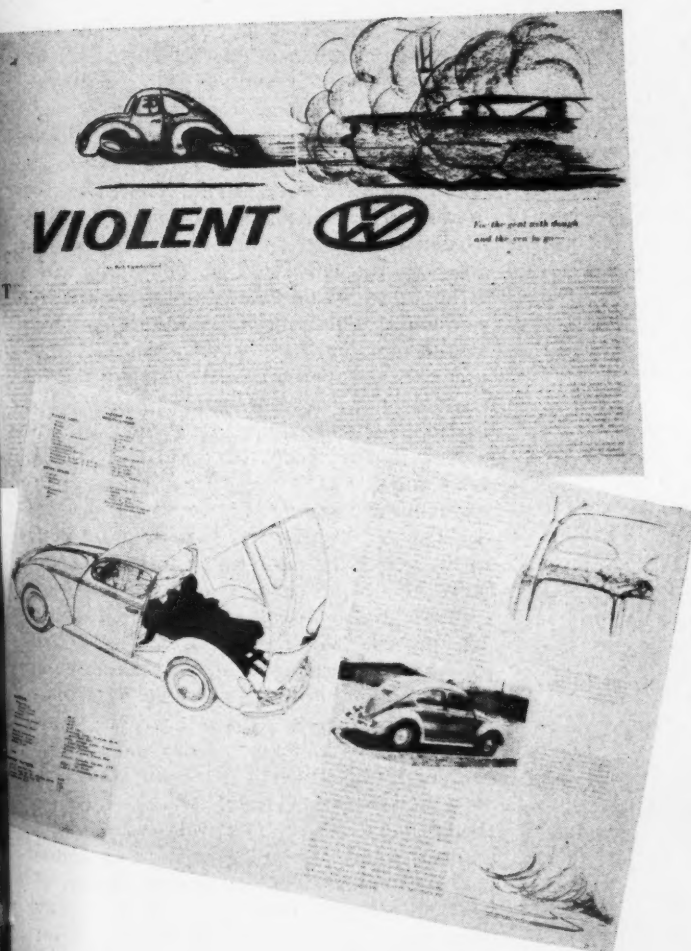
The exhaust system provided Howard with more problems before the machine was ready to run, but a novel setup was worked out with the final layout resulting in the mufflers criss-crossing in the trunk. With sounds that were a little more pleasing to the ears of the local law, the car was ready to roll.

With the car in running shape, Hiyama took it for a spin and found that the additional 300 pounds had made the ride a little mushy. In the interests of better handling, the springs were replaced with heavy-duty units as were the shock absorbers. This combination proved all that was necessary for top-flight handling.

Howard was also a little skeptical about the ability of the Renault brakes, but to date he has had no fade problems and gets quick action from a healthy stab at the pedal. He did change the tire size on the back wheels to 5.50 x 15 to reduce the slippage he got under high acceleration. Cooling problems cropped up briefly but all turned out well when it was found that a sticky thermostat was the culprit.

Hiyama is still not through with the machine. Additional plans call for a transaxle unit of the Corvair type and a higher-powered engine. "The way it is now the damn thing runs out of go at 125," he says.

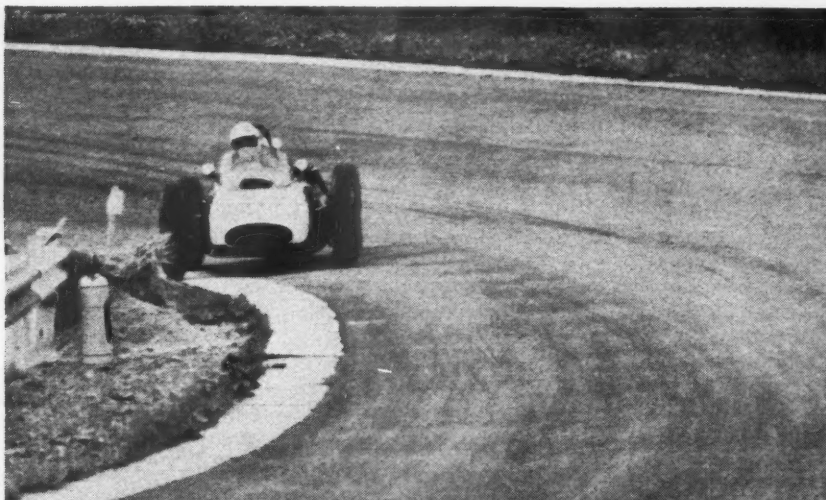
—BK



It was this story in the January, 1958 SCI that prompted Hiyama to try Chev conversion in the Dauphine. The Violent VW was also Chev-powered.



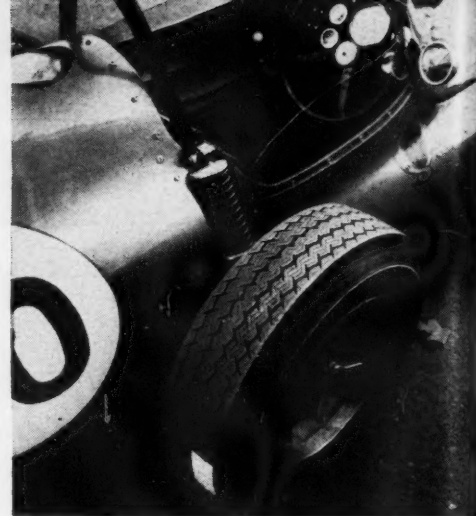
No-one can say they didn't try. Here's Chuck Daigh applying maximum effort in practice at Zandvoort, above, and during the car's only actual race appearance in the Belgian G.P. below.



# THE SCARABS WERE THERE



"We're all right behind you, boss!" Team spirit is evident as four crew members, including stripe-shirted manager Warren Olson, push Lance Reventlow out to practice at Monte Carlo.



By the time the Belgian G.P. rolled around, Goodyear had been able to build these broad, flat-treaded tires to suit the Scarabs' unusually wide-rimmed rear wheels.

► It wasn't a good show; it wasn't even a good example of what we can do. But it was the first time in decades an American racing car had done battle on European road courses. Faced with an almost impossible problem in logistics, the R.A.I. crew could make only minor changes in the machines while in Europe, with the help of John Cooper, Colin Chapman and parts suppliers like Koni and Dunlop. Now that they're back, the team's efforts will all be directed toward the American Grand Prize, happily to be held at Riverside, California, on November 20th. By then there should be more power, less weight and better handling. Not surprisingly, the Scarab four at 230 bhp is delivering the same power-per-liter as a big 4.2-liter Offy four at 385 bhp, which is about what the "air compressors" deliver nowadays. There should be untapped horses in the more modern R.A.I. design. A complete rebuild of the chassis is slated, but it's not yet known whether this can be finished in time for the November event.

Now that representatives of Great Britain, Italy and the U.S. have agreed on an Intercontinental Formula, Lance Reventlow has decided to take that route in 1961. It's close to his personal preference, expressed in the July, 1960 SCI, having a limit of 2½ liters in 1961 and a probable limit of 3 liters in '62 through '64. Tracks already suggested for the I.F. are Rheims, Silverstone and Monza, and the minimum race length is to be 300 miles. Thus R.A.I. itself will be abandoning true Grand Prix racing and the 1½-liter Formula, which is gathering more and more support overseas. We'd imagine, though, that Reventlow Automobiles — on a business basis — would be willing to undertake development of a 1½-liter version of its desmodromic four, on behalf of any party willing to pick up the tab. Unless this is done, it looks like we'll have to live forever with the myth that America can no longer produce a good little engine. —SCI



There was plenty of time to talk. Dick Trautman, left, and Chuck Daigh, center, lend their ears at Monaco to the comments of patron Lance Reventlow.

► At Porsche the new racing coupe is known as the "Abarth car" because its body was designed in Turin by Carlo Abarth's engineering staff and Scaglione. Solid ties between Porsche and Abarth have a historical basis and Ferry Porsche wanted very much to let Carlo have a chance to design a new racing Carrera to replace the normal GT. After considerable negotiation, a series of 20 356B chassis was sent off to Turin last fall.

As soon as car number one got back to Stuttgart with its Italian clothes, several shortcomings were immediately discovered. First of all, the interior had obviously been designed for an Italian, for virtually no one at the Porsche factory could sit in it. This severe lack of head room was accompanied by an almost complete absence of any steering lock. Body tools and snips brutally altered the shape around the wheels and a solution to the headroom problem had to be found before the car could be raceworthy.

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## DRIVER'S REPORT:

# PORSCHE CARRERA GTL

by Jesse Alexander

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Porsche wasted no time in putting its new car into competition, and its first race was the Targa Florio. A second GTL was raced in the 1000 Kilometer race on the Nürburgring, fitted with experimental disc brakes, then on to Le Mans with production brakes installed. On every occasion the Abarth Carrera exhibited impressive acceleration and a remarkably high top speed (timed on the Le Mans straight at 137 mph) leaving no doubt that its aerodynamics are superior to the production car. This, plus the fact that Abarth had succeeded in paring at least 330 pounds off the catalog Porsche (down to 1765 pounds), has resulted in real race-car performance, exactly what Porsche was after.

Sheer light weight was the prime requisite. The interior is stark, with pull-strap windows and plexiglas used where possible, no attempt being made to reduce noise or make the car luxurious. It is designed for weekend racers who, for approximately \$6000, can have a Carrera giving impressive performance with an amazingly docile and flexible engine that appears to be as happy pulling at 2000 rpm as it is at 7400.

Huschke von Hanstein lent me the Le Mans GTL shortly after its return from the Sarthe circuit. Nothing had been done to the engine and everything except the hand brake was in working order. Herbert Linge accompanied me to the car, warning of its outstanding ability to ship water and, in his wonderfully accented English, relating the misery of sitting in a soaking wet seat for the better part of 24 hours.

He also had to contend with several inches of water filling the bottom of the Carrera.

Pointing out the position of wiper and headlight switches and with a word of caution not to exceed the indicated 7400 rpm limit, Herbert left me to my pleasure. I turned on the silver coupe, still with its huge black Le Mans numbers painted on the sides and rear. On cracked throttle the Carrera fired immediately. Expecting a fierce clutch action, I was astonished to find that it was as tractable as a production Porsche. Stiffly sprung, the GTL still doesn't seem to have as harsh a ride as certain Super 90 Porsches on uneven surfaces, apparently due to a new type of Koni shock absorber. In a minute I was on the Autobahn, accelerating away like a rocket, passing slower traffic as if it were standing still.

A fast run on the Autobahn in a sports-racing car can be an amusing experience; even the police turn and look with envy as you roar by at 110 mph. Up through the gears using 7400 rpm, the Abarth Carrera arrived at a peak engine speed of 6900 rpm in top gear, the speedo hovering about the 130 mph mark and the rev counter trying ever so hard to knock off 7000 in top. Engine noise is brutal at high speeds and if a window is lowered the noise and turbulence is violent. This four-wheeled projectile is pointed rather than steered, and can be classified as a Spyder with a roof. A few of the latest GS four-cam plain-bearing engines are giving 135 bhp, most of the horses coming in with a punch at 5500 rpm.

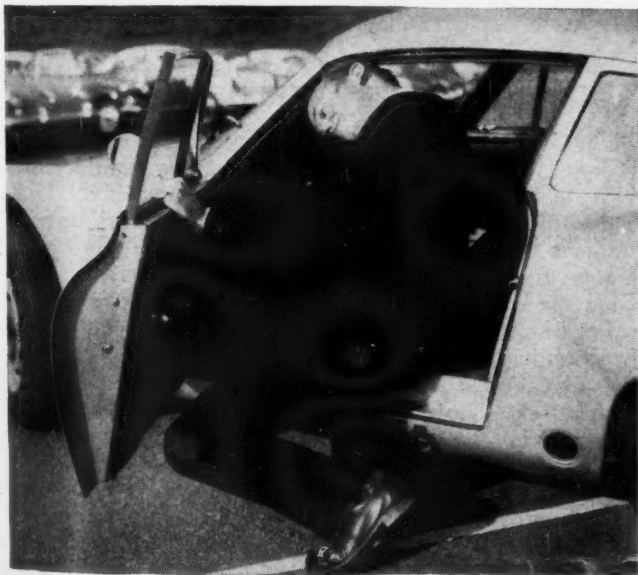
A superb driving position is one of the finest attributes of the Abarth car. Getting behind the wheel is another story, the occupants being forced to double over almost in half and ease in slowly, so low is the roof line. But behind the wheel, the driver has exactly what he wants within easy reach or sight. A revised instrument layout places a huge revolution counter, complete with red tell-tale, and other pertinent instruments directly behind the wheel and slightly higher than on the production Porsche. An oil pressure gauge is positioned on the floor directly behind the gear shift lever, and behind the seats a solid roll bar comes up out of the floor from both sides. The distance between the top of the driver's head and the roof is minimal yet adequate, but anybody over six feet would have a real problem.

Off the Autobahn, I drove to Stuttgart's Solitude circuit, a beautiful old-Watkins-Glen type of course that rivals the Nürburgring. The Carrera was fitted with German Dunlop "SP" belted tires which contributed greatly to its superb roadholding. Viceless and well-balanced are the two terms best describing current production Porsche handling, and they apply equally to the Abarth Carrera — with the single warning that breakaway is reached sooner and more easily with the high power-to-weight ratio.

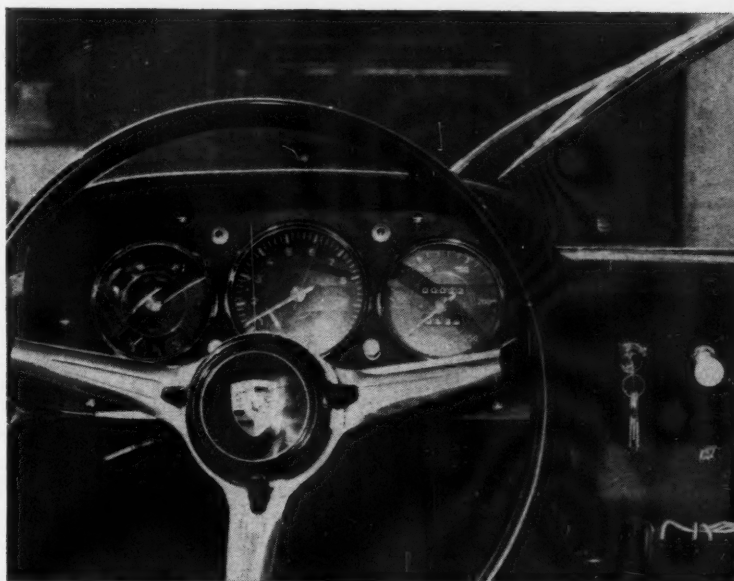
The Porsche sales department reports that the entire series of 20 Abarths is already sold. The problem at present is to improve its detail finish, which is not at all up to normal Porsche standards. Delivery is also way behind. It's a safe bet that the line of the Abarth car could influence future Porsche styling, and taking a long guess I can easily visualize a 1962 Porsche looking very much like this Italian/German effort. A slightly longer wheelbase and revised entry and exit would make it more comfortable and give the occupants more than just the present acceptable minimum of space. All kinds of interesting things can be expected from Porsche in the next few years and the Abarth-bodied GTL Carrera should be regarded not only as a racing GT car but as a stepping stone to new and exciting things to come. —JLA



After watching the GTL for 24 hours at Le Mans, SCI's European Editor finally gets his hands on it. He says police watch in envy as you roar by at 110.



Despite pretzel twist needed to get in or out, the GTL is comfortable to drive — when it's dry. In rain it ships water that won't leak out.



Large tach with tell-tale dominates instrument cluster. It's flanked by oil temp/fuel gauge and 250 kph speedo. Oil pressure gauge is on floor.

# WEIGHT: ENGINEER'S ENEMY

by Roger Huntington

1960's compacts gave weight a good fight, but in '61 — see Buick's aluminum V8 — the industry's waging the battle of the bulge in earnest. Techniques of today and tomorrow could cut auto weight in half!

► Engineers have long been striving to cut weight on all of man's conveyances. It makes a lot of sense. Unnecessary weight holds back acceleration and speed, retards maneuverability and wastes fuel — on every type of vehicle from a haywagon to a jet fighter. A gain in weight is a loss in efficiency and performance. The dedicated engineer should fight it with every practical means.

But we're interested primarily in automobiles, and this is a very special field. Let's do a little thinking on it.

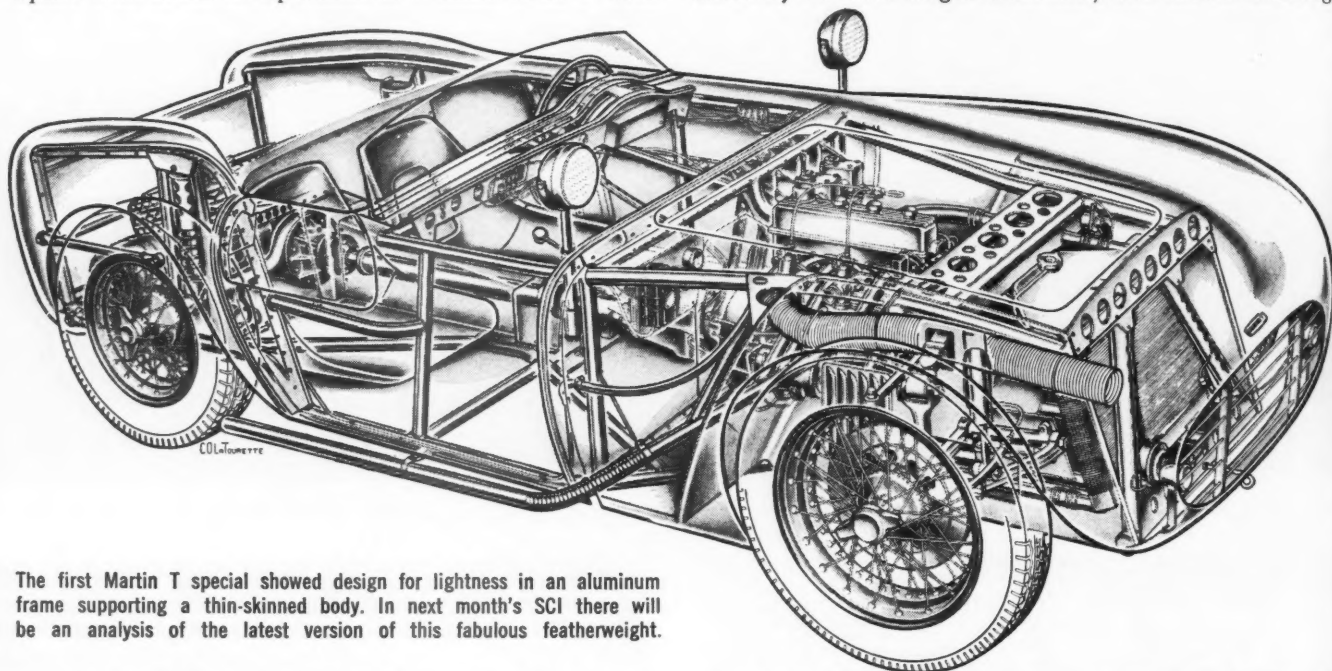
## STRESS AND STRAIN

As far as the designer is concerned, the weight problem is merely one of balancing working loads against stress, using materials that are economically practical.

When any piece of material is subjected to an external force or load, there will be a tendency to rupture the internal molecular structure of the piece. This internal "stress" is generally measured in pounds per square inch. For example, a 1500-pound pull on a bar with a cross-section area of  $\frac{1}{2}$  a square inch would be equivalent to a tensile stress of 3000

clutch plate pressure stress the flywheel in a complex way; the weight of the body bends the frame; suspension loads twist the frame — and subject suspension arms, wheel spindles, etc. to all types of stress; drive shaft torque causes very high unit compression pressures on the axle gear teeth; even wind pressure has been known to dent body panels. The problem is to design light-weight parts with enough strength to resist these loads without approaching the yield point of the material. We can use shape as well as size in the battle against weight; sometimes a well-placed fillet will get rid of a stress concentration area and permit the whole part to be made lighter. Over the last 40 or 50 years science has developed elaborate tables of formulas and strength figures that permit fairly intelligent design of parts on paper with a slide rule.

There's only one bug: predicting what actual maximum working loads will be. This is not as easy as it sounds. It's simple enough to calculate the bending stress on the frame caused by the static weight of the body with the car standing



The first Martin T special showed design for lightness in an aluminum frame supporting a thin-skinned body. In next month's SCI there will be an analysis of the latest version of this fabulous featherweight.

pounds per square inch. There are three basic types of stress: tension, compression, and shear (where the molecules are subjected to a crosswise sliding force). Most operating stresses in any part are a complex combination of these three primary stresses.

"Strain" refers to the deflection of a piece of material when subjected to a stress. All stress is accompanied by some strain, however minute. As the stress is gradually increased the deflection will eventually become permanent. That is, the part won't spring back to its original shape when the stress is removed. This is the elastic limit or "yield point" of the material in question. Working stresses must never exceed the yield point. The stress at which the part ruptures completely is called the ultimate strength. On brittle materials like glass and cast iron, the yield point and ultimate strength are virtually the same.

Now there are obviously dozens of distinct forces that stress the parts in an automobile. Combustion pressure in the cylinder compresses the con rod; centrifugal force and

still, but how do we predict maximum vertical acceleration of the body caused by road bumps, that act to multiply the weight in bending the frame? How do we predict the load on the wheel spindle caused by dropping into the deepest chuckhole the car is apt to hit during its life? Or how do we pinpoint the shock torque on the drive shaft caused by engaging the clutch with the engine revved up? How do we predict bending loads on the wheel or twist on the frame when running over uneven ground?

We don't. What we do is fall back on the age-old "factor of safety" — or should we call it a factor of uncertainty? All we do is divide the rated yield point stress of the material in question by a factor generally ranging from 2 to 4, and then use this figure as a maximum working stress in calculating the necessary size of parts. The result is inevitable: in many cases we are bound to have unnecessary beef in the part, material that isn't being worked to the limit during the normal life of the car. And it is also obvious that the very first order of business in reducing car weight is to learn more

about actual working loads on parts. We have made great progress in the last ten years, with strain gauge tests, destruction tests on artificial loading machines, Stresscoat analysis (where a special coating material will crack along major stress lines), etc. We're making progress, but we have a long way to go.

#### SPREADING THE LOAD

A conventional automobile is a collection of concentrated loads at a few points and a lot of iron that's doing practically no "work" at all. Probably the body-frame structure is the worst offender. The normal body and frame both absorb bending and torsion loads, but the overall stiffness-to-weight ratio is not too good because the two structures are fastened together through flexible mountings. The "unit", or frameless, body averages 50-60 percent better in stiffness/weight ratio. Here we eliminate the conventional sub-frame, weld the complete body structure up as a unit, and try to stress the panels more evenly. This seems to be the coming thing in body design all over the world.

But at best this is still a very crude science. There's still too much dead weight and too much rule-of-thumb in the design. We have to spread the loads more evenly over the full body structure. There's a technical principle involved here: for maximum bending and torsional stiffness in a structure, the material should be spread as far out as possible from the bending and torsion axes, to give each pound of material maximum leverage to resist these loads. In fact, stiffness increases approximately as the *fourth power* of the distance of the material from the neutral axis. (Thus doubling the depth

of a box structure multiplies stiffness 16 times!) And it's also obvious that we must stress the roof just as much as the floor in a car body. This is where current designs fall down, even our best unit bodies. Too much of the load is carried in the floor area where there's too much weight.

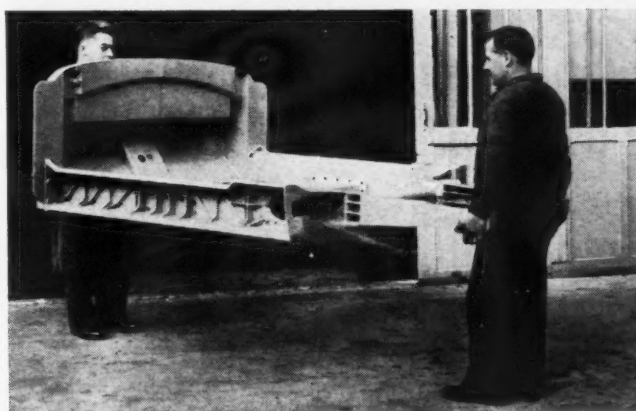
Take a look at a modern airplane wing or fuselage and you've got the ideal solution. This is called "monocoque", or full stressed-skin construction. Here we have just a very light, flimsy framework of bulkheads and stringers to maintain the shape of the structure, the bulk of the working loads being absorbed by the outside skin. Concentrated loads, such as engine and suspension mountings, are tied into the framework and spread over as wide an area as possible. A typical modern aircraft fuselage will have several times the stiffness-to-weight ratio of our most advanced unit-type car bodies.

This type of construction may not be practical for cars in the near future. Glass area would be a big problem, as would interior space distribution, door openings, etc. But we have a pretty decent substitute available right now. This is the "space frame". Jaguar started the ball rolling with its C-Type in 1951, and today it's accepted practice on most of the world's quickest sports and racing cars. Here we make no attempt at conventional stressed-skin principles, but we base the whole car on a light tubular framework in the general form of a box. By thus spreading the major structural members well away from the bending and torsion axes — and using carefully-designed truss-type bracing to tie the whole deal together — we can get a very high stiffness/weight ratio. The outer skin is just along for the ride, and

can be made of low-strength light-gauge material. Note: this space frame principle cannot theoretically compete with unit construction on stiffness/weight, and future developments in the latter could kill the advantage. But right now it looks like a good way to reduce car weight perhaps 15 percent with current materials. Something to think about.

#### DIETING WITH MATERIALS

When we think of lighter cars usually the first thing we think of is aluminum cars. Auto history is full of impressive examples of weight-saving through use of the light alloys. But wait just a minute . . .



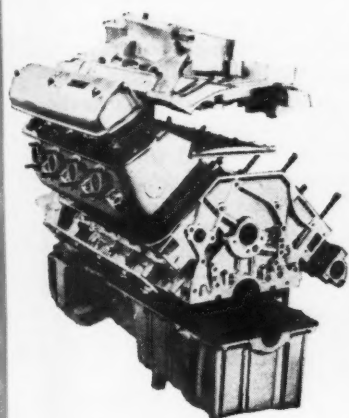
Die-cast aluminum bolted together was the frame for the 1956 Gregoire Sport. Lighter than steel, it's stiffer, too, thanks to deep girders.

Suppose we have the job of designing a simple tension link that has to carry a working load of, say, 12,000 pounds and has to be five inches long. Now we could construct this link of a good alloy steel with a tensile yield point of 120,000 psi. In this case the link cross-section area would be  $12,000 / 120,000 = .10$  square inch. The density of this steel would be .28 pounds per cubic inch, so the weight of the part would be  $5 \times .10 \times .28 = .14$  pounds. Or we could use a heat-treated aluminum alloy with a tensile yield of 45,000 psi and density of .10 pounds per cubic inch. Then the required cross-section would be .27 square inch and weight would be .14 pounds.

Moral: don't judge a material for construction entirely on its pound-per-cubic-inch rating. With optimum stressing the real criterion is the strength-to-weight ratio. If a heavier material can do more work we can design the part with thinner sections, so it might weigh no more than if constructed of a light alloy with less strength. The following table gives approximate strength/weight ratios for some typical auto construction materials:

Material	Yield, psi	Pounds per Cubic Inch	Strength/Weight
Gray cast iron	25,000	.26	96,000
Low-carbon rolled steel	38,000	.28	140,000
Low-carbon heat-treated steel	80,000	.28	290,000
Chrome-moly steel	120,000	.29	410,000
High-strength steel	210,000	.28	750,000
Cast aluminum alloy	24,000	.099	240,000
Heat-treated aluminum	45,000	.10	450,000
High-strength aluminum alloy	70,000	.10	700,000
Cast magnesium alloy	10,000	.065	150,000
High-strength magnesium alloy	20,000	.064	310,000
Titanium alloy	100,000	.16	630,000
Fiberglass laminate	17,000	.054	320,000
Plywood	7,000	.019	370,000
Glass	10,000	.09	110,000

(Continued on page 92)



The smart money is betting on wide use of aluminum for engines in the near future. Here are the major parts of BMW's light 173-bhp V8.

Weight, once the hallmark of the American car, suffered a severe setback for '61. We now have a stock V8 that delivers 155 horses from 215 inches and a mere 318 pounds — about half the poundage that power needed a decade ago! That's what happened when...

# BUICK BUILT A BETTER ENGINE

by Karl Ludvigsen

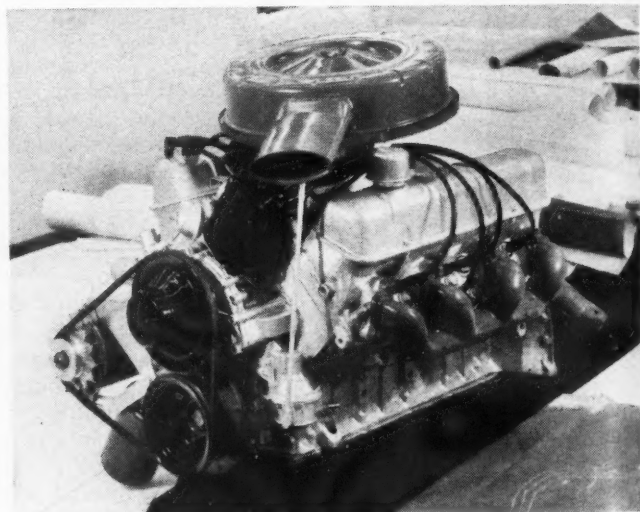
46/SPORTS CARS ILLUSTRATED/NOVEMBER 1960

► In the last months of 1948 two new engines were introduced that set the pattern for powerplant design for the decade that followed: the Olds and Cadillac V8s. Now we've entered a new, more progressive era of engine design in which there may be no single prototype. But we'll wager the most widely copied engine in the next ten years will be the superb new aluminum V8 by Buick — now, as in 1948, significantly a product of General Motors. As we'll see later, this engine and more like it make excellent sense for production passenger cars. They'll make a dollar go a long, long way. Our strong interest in this one is also based on its vast potential for use in sports and sporting cars of today and tomorrow, a potential that's predicated more on power per pound than on sheer massive output.

Why an engine of aluminum? The reasons are very interesting. For years the producers of aluminum have urged the use of this metal on the only basis that they thought would have any effect in Detroit: lower cost. This was sound, because it did indeed seem that the industry was far more interested in saving mills than in building a better car. It seemed that aluminum could play a part only if it offered lower finished costs than comparable iron or steel parts, a point on which Reynolds, Alcoa and Kaiser were all supremely confident and infinitely helpful. But this is *not* why Buick built its light-weight V8. It's here because it makes far better overall performance possible at only a slight *increase* in manufacturing cost. It's here because GM wanted to build a better automobile.

## WHAT CAN ALUMINUM DO?

Aluminum did more than just lighten the engine. A lighter powerplant meant that pounds could be trimmed off the mounts and supports, in fact off the whole front end of the car, to effect an overall reduction out of proportion to the drop in engine weight alone. If the car's lighter, it can be given the same performance as a predecessor by a smaller engine, which automatically means more miles per gallon. Lighter weight means lower running costs, and with modern



Buick sales department asked that the V8 be handled with care during production to ensure that it retained a shiny "aluminum" appearance.

suspension design it needn't mean a poorer ride. To the contrary, a lighter front end finally brings a balanced ride and stable handling within the reach of the American six-passenger car.

GM's plunge into aluminum is made even more remarkable by its identification in the industry as an "iron company". Its facilities for the casting of iron and forging of steel are huge enough to offer tough competition to rival materials and methods. But the iron industry hasn't improved its techniques to keep pace with the changing character of the automobile business, so Detroit has been forced to look

elsewhere for metals that can do the jobs of the 1960s. This switch may inspire the apostles of cast iron to greater efforts, which is just what Detroit wanted all along!

Having decided to make a radical move, GM made it very conservatively. Once given this inch, the engineers were anxious to take a mile or more, but when facing the frown of president John Gordon and the question, "We're spending a lot of money on this; are you *sure* it's going to work?" they were naturally reluctant to go too far out on a limb. The result is that this new V8 is not so much the isolated end product of years of research as it is a cautious first effort, from which great advances are yet to be expected. Everyone associated with it at GM says, "This is just the beginning. We've only begun to learn what we can do with aluminum. Today it's where cast iron was decades ago." This is an exciting prospect.

#### STARTING WITH AN IRON ENGINE

To begin at the beginning of the beginning, we can go back either to the activities of GM's Engineering Staff Research Laboratories or to the Buick Division; both were doing pioneering work in the design and construction of aluminum V8s at about the same time—1950. Since Engineering Staff did the initial planning, and also gets much of the credit for "selling" the aluminum engine to GM's top brass, it's fair to start by peering over its shoulder.

The first experimental engine built wasn't of aluminum; it was a little cast iron V8 of 235 cubic inches. Working from this basic engine, a design for aluminum was prepared and the displacement simultaneously increased to 253 inches. Quite a few basic problems had to be overcome in making this first engine structurally sound, but the result was a good test unit with cylinder walls cast integrally with the block. By 1952 these were being installed in Chevys for road testing, and another version of the engine, with wet liners to allow quick, easy changes of cylinder wall composition, was being developed. Later on, to allow direct comparisons with an existing iron engine, some 283-inch V8s were built up

decided, "If you can make it any bigger, let's do it right now." It was then expanded to its present 215 cubic inches (3.50 x 2.80 inches). This first prototype had its cylinder block cut off at the crank centerline, and had a combustion chamber design that was a literal expression of Caris's recent researches in chamber characteristics. The head was perfectly flat, save for shallow recesses for the heads of the vertically-placed valves, and the whole chamber was a cavity cast in the piston crown. These Engineering Staff prototypes were machined by Buick, building experience in aluminum for that division. The first one was running in the Summer of 1958, before the unit was finally turned over to Buick Division for redesign for production.

#### EXPERIMENTS WITH ALLOYS

Both at Staff and at Buick one of the prime goals was development of an aluminum alloy for the block that would be sufficiently hard and wear-resistant to make iron liners, chrome plating, metal spraying and other expensive expedients unnecessary. The most promising alloys, after years of experimentation, had been those with a high percentage of silicon. A typical "hypereutectic" or high-silicon aluminum alloy contains 20% silicon, 2% copper, 1% magnesium and 0.5% manganese. GM tried every reasonable alloy from 16% to 20% silicon, with many other alloying elements, and got results that were often very encouraging. The GM dynamometer durability test (100 hours at peak power, 140 hours at peak torque) showed wear characteristics generally superior to those of cast iron, but there was one problem that persisted: that of scuffing of the bores by the rings when the engine was started up from cold. Aluminum engines warm up quicker than their iron counterparts, but apparently not enough to reduce this scuffing. Mainly for this reason, the decision was made to bring the engine out with iron liners cast in place in a block with a more modest silicon content.

There are some interesting sidelights on this part of the program. High-silicon aluminum alloys have a reputation

for being hard to cast and hard to machine. At first, the shops agreed completely on the machining tenet. Tool life was short, even shorter than with softer aluminums, which themselves are worse in this respect than cast iron. But as they became more familiar with the material and the tools it demanded (usually tungsten carbide), the machinists found they liked the alloy's solid feel, its hard, crumbling chips that made it easier to hold dimensions.

Though inserted wet liners, in direct contact with the cooling water, have long been used in European designs (a few: Triumph, Alfa, Ferrari, Lancia), not to mention in the early Engineering Staff designs, Buick unhesitatingly ruled them out of consideration for production for several good reasons. One was concern over possible water leakage from a poorly-sealed liner. Remember, there would be eight chances for leakage

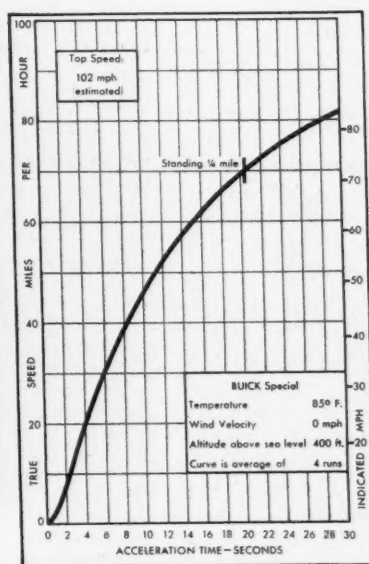
per engine in this case, and more of the units must be built with less reliance on hand craftsmanship than any of the overseas examples. Also, wet liners usually contribute less to the block's structural strength than does an integral cylinder wall. So strongly did Buick feel on this point, in fact, that it would have remained with a cast iron block rather than take a chance on wet liners (remember the frown of John Gordon).

#### BUICK'S BACKGROUND

This evaluation of wet liners was not mere theorizing on the part of Buick, which had designed and built the alu-



Testing in Opels and Corvairs preceded V8's installation in Buick Special. Curve is for automatic-box car.



around Chevrolet bottom-end parts. All these bigger test units had aluminum blocks with wet liners; it's probably these engines that have led to the persistent rumors about light-alloy Chevy cylinder blocks.

So it wouldn't be caught off-balance. Engineering Staff had begun drawing-board work on a production aluminum engine as early as 1956, under the direction of Darl F. Caris. Thus it was more than ready to steam ahead when the word was passed, in mid-'57, to commence with the aluminum V8. It was originally drawn up as a 180-cubic-inch unit, with room to spare for future increases, but GM's Charles A. Chayne

inum-block, wet-liner V8 for the exotic Le Sabre and XP-300 experimental cars of 1951. Much of the basic design work on this supercharged engine was done by Joseph D. Turlay, now director of power plant activities for Buick and the man in complete charge of the "X-100 project," as this latest V8 was known throughout its gestation. Coincidentally, the XP-300 engine was exactly 215 cubic inches (3.25 x 3.25 inches), just the same as the X-100 or Buick Special engine.

Few features were carried over from XP-300 to X-100, but one was a crankcase extending below the crank centerline, a Buick trademark for many years and an excellent way to give rigid support to the main bearings. It also allows a more rigid engine-gearbox assembly, by virtue of better bracing between block and bell housing.

More out of sheer enthusiasm than actually necessity, Joe Turlay gave the XP-300 massive main bearing caps that were laced into the block by cap screws at the sides in addition to the usual studs. The Special's caps are more normal in shape but are made of cast iron, a practice that was followed all the way through from Staff's work to production. When light alloy caps are used, they can create clearance problems. If clearance is proper when the engine's at operating temperature, it'll be too tight and tend to crush the bearing shells when cold. This hasn't occurred with the iron caps. Some designers have doubted that the combination aluminum-iron bearing bores can be line-bored accurately in production because of the different cutting rates; Daimler-Benz is one firm that says it hasn't licked this problem. Buick has managed it by taking three separate cuts wherever the two metals have to be machined together, making the last cut a very light one of only .007 or .008 inch. Rolls-Royce's wide experience with aluminum engines allows it to use forged heat-treated aluminum main caps on its new V8 engine, incidentally.

#### BLOCK CASTING AND MACHINING

A fully-automated line machines the 60-pound blocks, special care in handling being called for to avoid damage to the softer surfaces. The alloy finally chosen for permanent-mold casting the block and heads was GM 4323M, which is very similar to SAE 323 alloy in composition. Alloying elements are: 6.5 to 7.5% silicon, 0.25% copper, 0.2 to 0.4% magnesium, 0.6% iron, 0.35% manganese, 0.35% zinc and 0.25% titanium. The result is an aluminum that's especially suited to intricate castings that must supply high strength under extremely corrosive conditions, exactly what was needed here. On the grounds that it might not be able to take the high stresses involved, the block is given very few broaching operations. On the line, steel sleeves are pressed in the two guiding holes on the block's lower left edge; these two holes have a locating function during machining only.

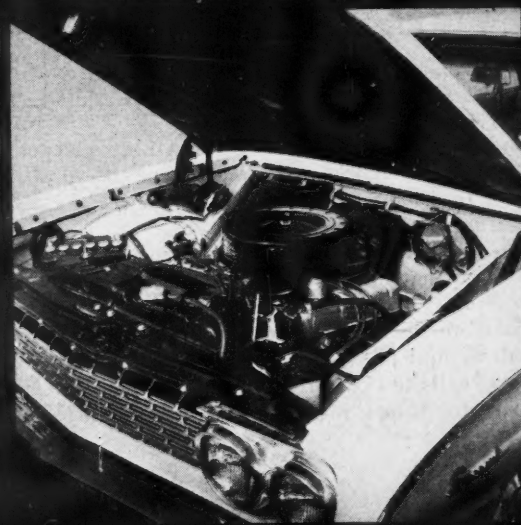
No significant holes are cast into the block, as can often be done by die casting. They're all drilled, some of the longer oilways by bits that look more like wood augers than metal drills. Though there was hope that the higher cutting rates allowed by aluminum would shorten overall machining time, Buick's experience has been that it takes about as long as an iron block—at this early stage in the refinement of the production process. Tool life is eventually expected to be better than that experienced with iron. As a precaution against possible porosity in the block castings (aluminum has been described as "a bunch of holes fastened together") they're given several tests for leaks under air pressure, along the machining line, and can be given as many as three impregnations with sealants if necessary.

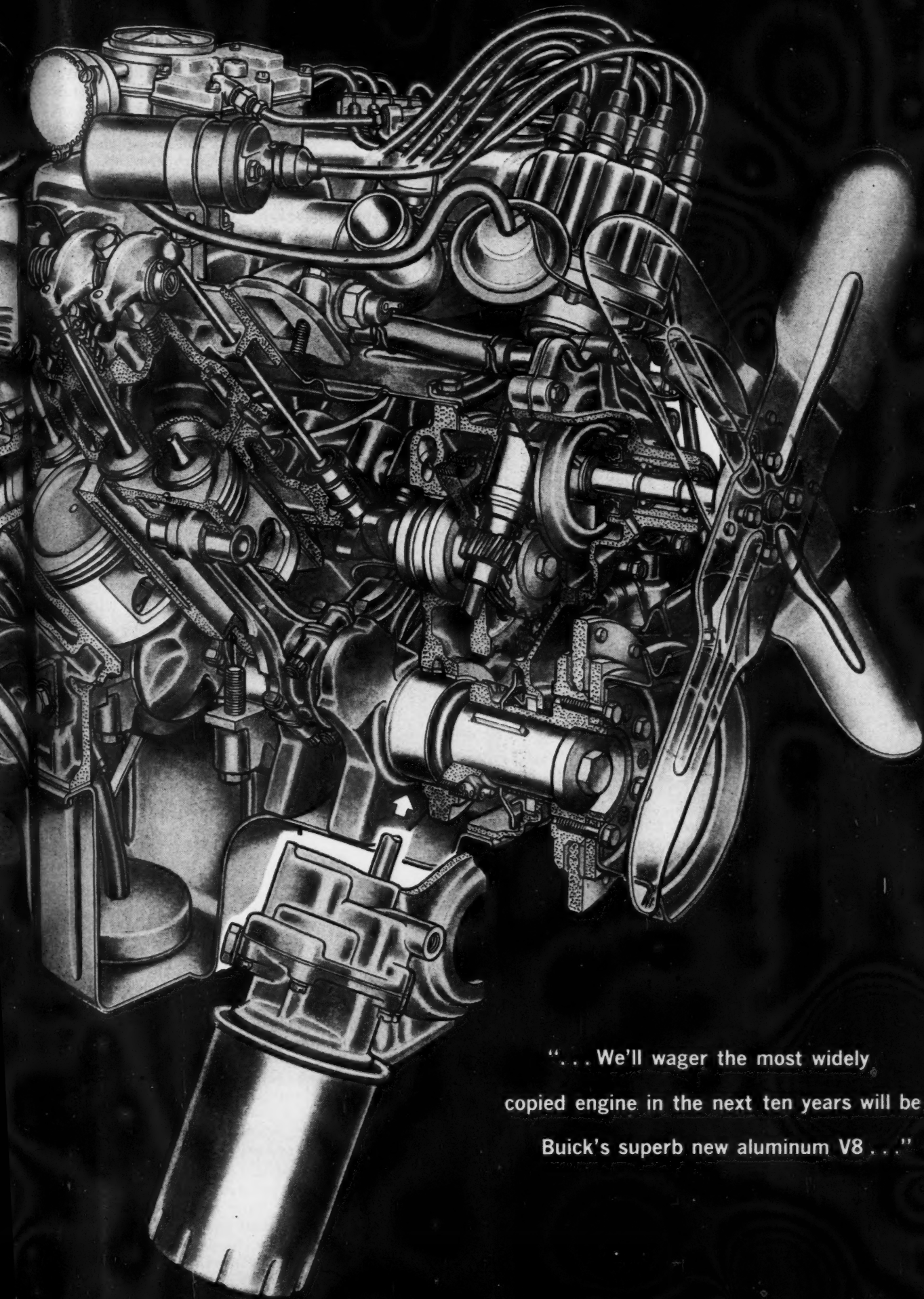
#### IRON LINER CHARACTERISTICS

Perfect Circle makes and machines the cylinder liners, from the same cast iron GM uses for cylinder blocks (GM 13M).



Under-hood appearance of Buick Special is straightforward, with plenty of space around the small, light V8 powerplant.





"... We'll wager the most widely  
copied engine in the next ten years will be  
Buick's superb new aluminum V8 ..."

At present the liners are centrifugally cast, but there's some doubt at Buick whether this is any better for this application than ordinary gravity casting. To hold the liner rigidly in place in the block, a series of small, shallow grooves is turned over its whole outer surface, giving it a ribbed appearance. This turning operation is expensive and produces waste metal, however, so development is continuing on a knurled surface that may do the same job at less cost. Preheated to prevent chilling in the mold, the liners are held in place by mandrels as the block is cast around them. The liners are of course cleaned before casting, but no special bonding-type surface treatment is applied, as in the Al-Fin process.

Insertion of this liner does slow the rate of heat transfer to the coolant, compared with an aluminum cylinder wall, but on the other hand the heat transfer characteristics of the high-silicon aluminum alloys aren't very favorable either. In any case, Buick is just as happy to have the bores running a bit warm, as this reduces power loss through wall friction. There is some feeling that the engine's octane requirement may have been raised a fraction by the use of the liners.

On the service side, the only piston oversize that will be offered at first will be .010 inch. Questioned as to the absolute maximum that might be bored out of these liners, Buick suggested .060 inch, with the warning that this would need a very careful examination of liner position in the block and a mighty steady hand at the boring bar. They definitely do not recommend such an oversize. Though the engine has already been expanded from its original design size, as mentioned, there is still limited room for bigger liners and a longer stroke. And by the time a bigger bore is needed, GM will probably have come up with a workable high-silicon alloy that will allow them to leave out the liners entirely.

Asked how he'd reduce the engine's displacement to 180 cubic inches again, to get into the three-liter competition class, Joe Turlay said if it was for racing purposes he'd shorten the stroke only. This would call for a stroke reduction from 2.80 to 2.34 inches, or a reduction in crank throw of a little less than  $\frac{1}{4}$  inch—easily handled by a good crank specialist. For the first time at Buick, the crank is made of cast malleable iron or "Armasteel", as GM calls it. Iron is used here, and in every other possible location in the engine, for two reasons. One is that GM's iron facilities are extensive, as we said earlier; the other is that iron costs less than the alloys of steel that might be employed. Even with this kind of economizing throughout the engine, to offset the still-high costs of aluminum, it remains slightly more expensive than a comparable iron unit.

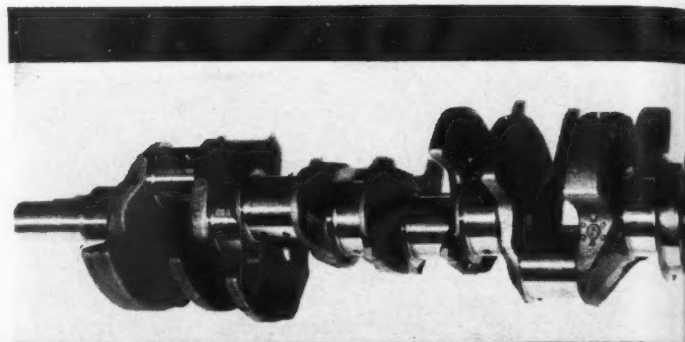
#### BOTTOM-END SIZES AND WEIGHTS

The accuracy of the Armasteel casting process is such that the cheeks of the six crank counterweights can be left in the as-cast condition, no machining for width being required. But since there's still a greater tolerance in casting than there would be in machining, this type of crank demands more generous end-to-end clearances within the crankcase than would otherwise be granted. The cylinder centers are spaced at 4.240 inches, and the offset of one bank of cylinders from the other is .740 inch. All the main bearing journals are 2.2986 inches in diameter—2.3 inches in other words—and all are .802 inch wide except the center main, whose .821-inch width includes extra space for thrust surfaces. The rod journals are an even 2.0000 inches in diameter with bearings .737 inch wide. All the bearing shells are GM's steel-backed Durex 100A.

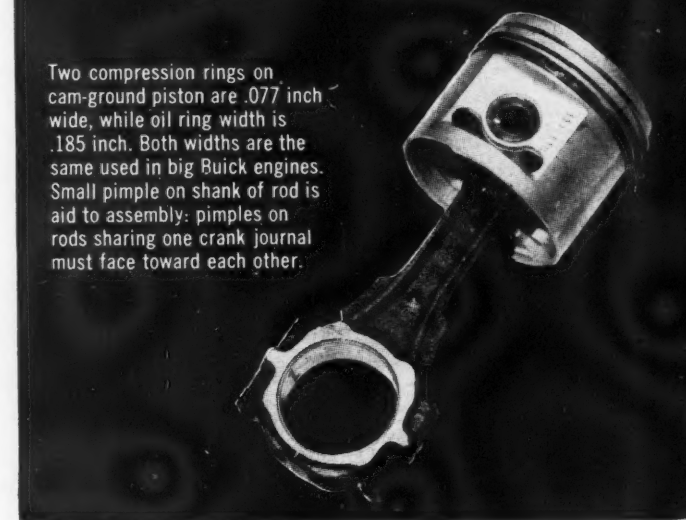
Connecting rods are conventional in design, forged of SAE 1141 steel along lines time-tested by Buick. They're 5.66 inches long, center to center, which compares logically with the 5.70 inches of the small Chevy V8 and the Corvair's 4.72

inches, the shortest in U.S. industry. Weight of the Special's rod is  $17\frac{1}{2}$  ounces, against 19 ounces for the Chevy V8 and  $13\frac{3}{4}$  for the Corvair. The piston pin, .875 inch in diameter, is pressed into the rod little end, and retains a piston with a short, full skirt. Two compression rings and one oil ring are carried below a piston crown that bears a circular depression in its center, forming a significant portion of the combustion chamber.

Designated a "spheroid-shaped" chamber by Buick, the combustion volume is a practical application of the more radical design originally proposed by Engineering Staff for



Cast nodular iron crankshaft construction is new to Buick but has been tried by Pontiac. Ford, however, uses many cranks made this way.



Two compression rings on cam-ground piston are .077 inch wide, while oil ring width is .185 inch. Both widths are the same used in big Buick engines. Small pimple on shank of rod is aid to assembly: pimples on rods sharing one crank journal must face toward each other.

this engine. New to the industry, it's a promising design that's given good results. Our illustrations show the shallow, ovoid-shaped depression that's machined in the head for maximum accuracy, slightly asymmetrical in depth to cater to the valve placement—a modest 10 degrees from the cylinder centerline. Machining of the chambers is a nice touch, typical of Buick's thoroughness, but we were impressed by the as-cast finish of the chamber. This may be a point where money can be saved later without affecting efficiency.

#### NOVEL CHAMBER, CONSERVATIVE HEAD

The head chamber roughly matches up with the depression in the piston crown, leaving an area all around the rim of the piston, amply cooled by water passages in the head, to serve as a quench area. The spark plug, an AC 45-FFS, is placed as close to the center of the chamber as possible, right next to the valves. From both these techniques a chamber results that has the ample quench area of a wedge-type

volume combined with the short flame travel typical of the hemispherical chamber. It's a happy alliance that's said to allow regular gasoline to be used with the Special's 8.8-to-one compression ratio. If the depression in the piston is reduced to a depth of 1/16 inch, the ratio is increased to 10 to one, the figure that's being considered for a future power pack.

Also cast in a semi-permanent mold, with an intricate core, the Buick's bare cylinder head weighs a mere 14 pounds. Its general valve and porting layout is very sound. In each chamber the intake valve is the one nearest the center of the engine, which makes manifold passages as short as can be and allows the best possible distribution. The four intake ports lead into their respective chambers at an angle of about 20 degrees, to impart a turbulent swirl to the incoming charge, and there are also four separate exhaust ports. In keeping with the conservative approach to this first aluminum V8, inserts are used at the valve seats and guides. Of cast iron, the guides are pressed in place. At this writing, two ways of installing the sintered iron valve seats are being evaluated. One, the likely choice when the necessary machinery is made to work unflinchingly, is heating the head to 375 degrees in an oven and pressing the seats in at ambient temperature. The other is to bring the head to a more moderate 200 degrees (by infra-red lamps or even by the heat of a wash bath) and insert seats that have been pre-chilled.

The valve head diameters are generous by Buick standards: 1.50 inches for the intake and 1.3125 for the exhaust. The actual port diameters just past the valve seats are 1.280 inches and 1.10 inches respectively. Seated directly on the head, the single valve springs are stiff, exerting 64 pounds

force with the valve closed and 168 pounds with it open. The opening is handled by the usual rocker gear, with some new techniques. Four die-cast aluminum stands support each rocker shaft, which in turn carries eight die-cast aluminum rockers, as first used on the big Buick V8s in 1960. Sintered iron inserts are used at the contact points: an anvil at the valve end and a cup at the pushrod end. The rocker ratio is 1.6 to one. Some preliminary consideration was given the type of stamped rocker used by Chevrolet and Pontiac, but it was felt that tooling up for it would be a needless expense while these neat die-cast rockers were available. Zinc-plated to simulate aluminum, the rocker covers were "styled" by Engineering to resemble those of the bigger Buick engines.

#### BUICK'S APPROACH TO VALVE TIMING

As in the Corvair, hydraulic lifters solve the problem of consistent valve clearance with the varying expansion rates of an aluminum engine. They're fed with oil by two galleries that run along the outside of their guide bores, whence two small passages also run to the forward rocker stands on both heads. The right-hand lifter gallery, being nearest the oil pump, doubles in brass as the main oil gallery for the camshaft and crankshaft bearings. Unusually for a production aluminum engine, there are five removable steel-backed bearings for the cast alloy iron camshaft, again from well-warranted conservatism. They'll probably vanish as experience is gained.

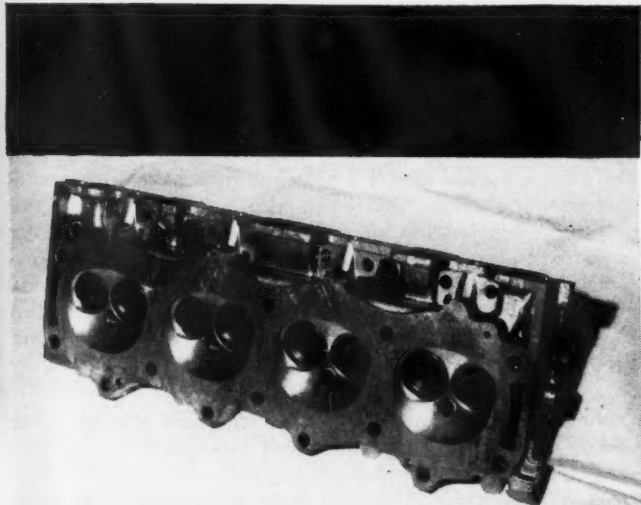
The Buick philosophy of cam and valve design makes use of valve and port sizes that might be considered small in relation to the displacement, to keep mid-range torque at a maximum, but used with cam timing that can be called radical, to preserve power at the high end. It's a canny combination that's produced some remarkably versatile engines at Flint, where they take special pains with the exact shapes and flow values of the ports, using equipment similar to but better than that of England's Harry Weslake.

When this Special engine was first put together, then, it had a cam much like that used in the big Buick, with durations around 290 degrees. With the valve sizes they had (which were proportionally a bit large, as we said) this worked fine at the high end but not so well in the mid-range. So the timing was cut back to its present figures, which follow:

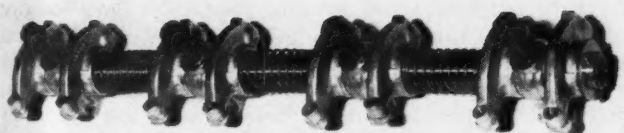
	Intake	Exhaust
Opens	29° BTDC	67° BBDC
Closes	71° ABDC	33° ATDC
Duration	280°	280°
Overlap	62°	
Lift	.383 inch	.383 inch

Rotated by a sintered iron crankshaft sprocket and a chain 7/8-inch wide, the cast iron cam sprocket drives more parts than the camshaft alone. Just outboard of the upper sprocket is a sintered iron eccentric for the fuel pump and a skew drive gear for the distributor and oil pump—sprocket, eccentric and gear are all locked to the camshaft by the same key. The Delco distributor is conventional, but fires in an order that differs from the bigger Buick V8s and is the same as that used on the small Chevy: 1-8-4-3-6-5-7-2.

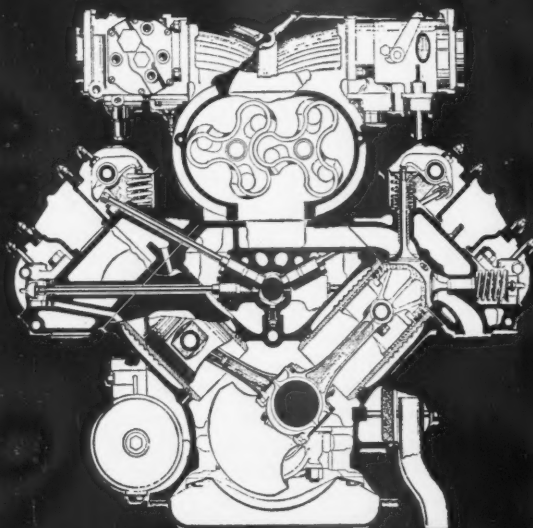
The general layout of the front-end accessory drive, with its single shaft at 33 degrees to the vertical, was conceived by Engineering Staff and greatly simplified by Buick. In particular it was possible to combine several castings into a single clever die-casting serving as a cover for the oil pump, a housing for the bypass and pressure-relief valves, and a mount for the oil filter. The sintered iron oil pump gears are actually housed in the aluminum front cover, which also carries the fuel pump and acts as half the water pump housing, incorporating two passages to carry water into the front of the block.



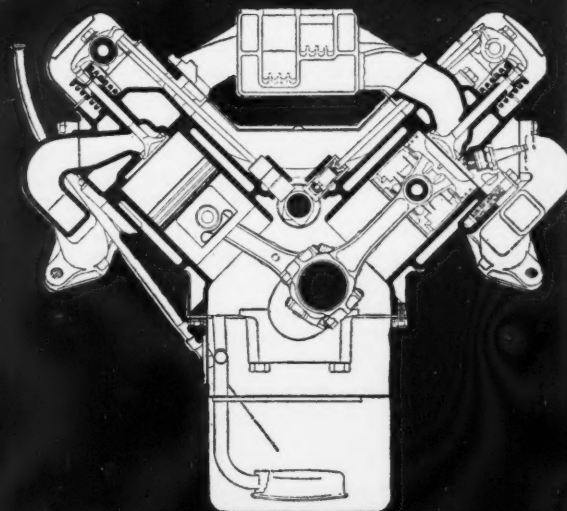
Machining of combustion chambers is complete, even to unusual removal of exposed threads in holes for 14 mm AC spark plugs.



Aluminum really is everywhere. Four die-cast stands support shaft that carries spring-held die-cast aluminum rocker arms.



Buick gained much experience with aluminum construction, wet cylinder liners with 335-horsepower supercharged V8 built for XP-300, Le Sabre.



215-inch X-100 engine, as originally laid out by GM Engineering Staff, lacked cylinder liners and valve guide inserts and had vertical valves.

#### COOLING FLOW AND CORROSION

A point-to-point fan belt system is used, i.e., the only belt to round three pulleys will be the actual fan belt, which also drives the generator (at 2.35 times crank speed) located on the right. Power steering pumps or air conditioning compressors get individual drive pulleys and belts. Turning at .85 engine speed, the water pump impeller is die-cast aluminum over a sintered-iron hub insert. Cooling water must flow all the way back through the block to the very rear before it can rise upward into the heads, through which it flows forward again to outlets forward of the front intake ports. Since the same cylinder head is used for both sides, rearward extensions from the intake manifold must be supplied to block off the superfluous outlets. It's cheaper and easier to treat all the heads the same than it would be to make distinctions between "left" and "right" layouts, even though a couple of machining operations go unused in the former case.

Emerging from the heads, the now-hot water flows back through the complex aluminum intake manifold, first through a lower level all the way to the back of the casting, then forward again on a higher level to a single main water outlet at the front. Here the thermostat (170-degree) is installed, with a small warm-up bypass pipe to the water pump fitted just below it. While we're dealing with the coolant, you may well ask what Buick's experience with corrosion has been. If galvanic corrosion is referred to, the kind occurring where iron and aluminum are cheek by jowl in contact with the coolant, the answer is that there are very few such places in this new V8. In fact, Buick has been engaged in a gradual changeover to aluminum on its big V8s for several years, beginning with the water pump outlet, then the pump housing, finally the whole timing chain cover. In these engines, where there was far more iron-aluminum contact,

galvanic corrosion was no problem.

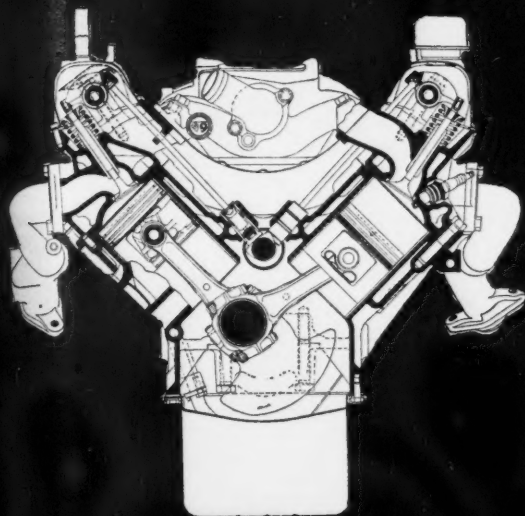
Every kind of water known to the American motorist has been tried in the Special engine, without producing corrosion. The water passages develop a hard, black aluminum oxide coating that protects them. There's been much talk about the supposed dangers of using anti-freeze with aluminum, but the facts are just the opposite. Any anti-freeze with the usual corrosion inhibitors will be better for the cooling system than plain water. Wondering about salt water? Thinking this compact, light engine would be ideal for a marine conversion? You're not the first to come up with that idea. All we can say at this point is that many die-cast aluminum outboard motors work fine in salt water.

#### GOOD BALANCE FOR SMOOTHNESS

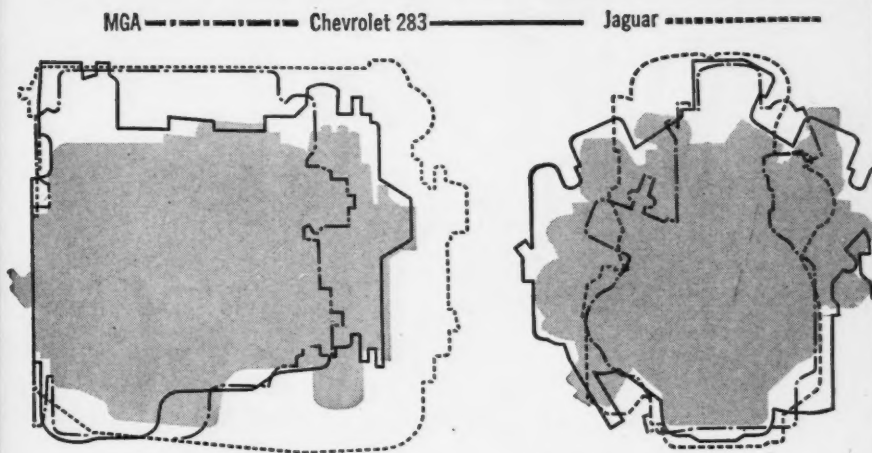
Atop the intake manifold, with its nicely-laid-out pipe work, is a Rochester 2GC two-throat carburetor with a bore size of 1 5/16 inches. Higher yet is an air cleaner of the low-priced polyurethane foam type that's being more and more widely used in the industry. Out on the exhaust side is manifolding that's as smooth and simple as anything from Detroit, the two 1 5/8-inch down-pipes joining below the engine at the right to exhaust into the single 1 3/4-inch main pipe. The muffler is neatly placed across the car behind the rear axle, with both inlet and outlet at its right end.

As the engines come off the assembly line, they're balanced while running under their own power on natural gas, in a new line of special balancing benches developed by GM Research. Balance is obtained by inserting appropriate plug weights in a dozen holes around the vibration damper in front, and by either inserting plugs or punching holes at the back, depending on whether the flywheel is for standard shift or automatic. The result is an uncannily smooth and quiet powerplant, judging by our driving experience with it at the proving grounds. It has a wonderfully

**"Buick feels the engine is still oversized, based on the remarkable fact that there's never been a major component failure during the whole testing program!"**



As finally readied for production by Buick, the X-100 had deeper crankcase and different chamber design.



For would-be engine swappers, drawing compares V8 in gray with popular sports units.

solid "feel", at whatever speed you care to run it. With hydraulic lifters, that will be anything up to about 5300 rpm. Tests with solid lifters were just getting under way as we write, but the engine has already shown a willingness to turn 5600 all day long. Buick feels the engine, for all its lightness, is still oversized, based on the remarkable fact that there's never been a major component failure during the whole testing program!

Rating of the Special engine, as we go to press, is 155 horsepower at 4600 rpm and 220 pound-feet of torque at 2400. Though Oldsmobile has designed completely different pistons, heads and manifolding for its version of the engine, it's expected to be rated at a similar level. At the last minute, after the production budget for these engines had been settled, Pontiac decided it wanted some as optional equipment for its Tempest, and had to take the same engine that Buick's using. Pontiac won't get many, so if you want a V8 in a transaxle chassis, you'd best order it right away.

Buick's power pack, still in the works right now, will probably include the 10-to-one compression ratio, a four-throat carb with new manifolding, and a single exhaust pipe enlarged to 2 inches (the narrow floor pan tunnel probably won't have room for two pipes). This should bring power up around the 175 mark, which puts one horse per cubic inch within remarkably easy reach of this egregious engine. After that's attained, the next mark will be one horse per pound, which infers 318 horses—assuming an engine with no mounts, automatic transmission flywheel, and with all standard accessories. This lightness is a marvelous breakthrough, impressive in all respects. In comparison the Corvair engine weighs 282 pounds for only 140 cubic inches and the Falcon engine, using the most up-to-date cast iron techniques for 144 cubic inches, weighs 348 pounds.

#### APPROPRIATE TRANSMISSIONS

Obviously this Special V8 is going to be in furious demand

among enthusiasts for all kinds of sporting uses, most especially for engine swaps in all popular imported sedans and sports cars. Why? A highly typical imported car engine, the 1.6-liter Volvo four, weighs almost exactly the same as this remarkable V8, at less than half the displacement! An illustration directly above gives you an idea of the relative sizes involved.

Assuming you're about to swap, you'll probably want to know whether or not the Corvette four-speed box will work well with this engine. But for a few decibels of sound, we'd be able to report that you could bolt one right on! Buick no longer offers standard shift at all in its larger lines, so there was no point in building its own three-speed box. Looking about for a three-speeder for the Special, Flint decided to use the Chevrolet unit, and tooled up for the necessary special bell housing while routine testing of the combination was begun. Only after quite a few bell housings were cast and machined was it decided that the Chevy was a shade too noisy for Buick's taste, and a switch was made to a Borg-Warner transmission with a different mounting bolt pattern but with the same pilot bearing size.

So there are some nice aluminum bell housings around, but the word is that sporting types around GM have appropriated all the ones that weren't scrapped. As a matter of interest, a Special sedan was equipped with a Chevy four-speed with a wider ratio spread and with the 3.08-to-one axle ratio that's used with the automatic transmission cars (3.36 is now standard), and the resulting performance was so impressive, so versatile, that they were thinking of trying a 2.9 rear end! That was with the standard Special tune. With the power pack this engine should perform spectacularly, and once the speed shops have had their way with it—as they will when its potential is made clear—it should become one of our best competition engines. This deserves to be said: when a better engine was built, Buick built it. —KEL



# The Beast out of Schtunke

by Sir Bertie Barstop as told to Roger Proulx

**After the demise by mortified apoplexy of the great Herr Schtunke, a memorial race ensued that could only be halted by a jeroboam of champagne!**

- Large? American automobiles? Nonsense! Take the magnificent 1924 Schtunke I once owned, for instance. What do you have around these days with a wheelbase of 19 feet, 9 inches? Or weighing close on to six tons? Or with 28-inch wheels?

Herr Karl Schtunke liked large cars and that was that. When he set out to design and build his own he was determined that it would be one of the, if not THE, largest automobiles to convey a gentleman from point to point in comfort.

I picked mine up from the Schtunke Motoren Werke, in Bad Schtunke, Bavaria, in October of 1924 and drove it personally back to England. Price? Well, I believe it would work out to about 41,000 of your dollars at that time. When you take into consideration the quality and rarity of the car, it wasn't too high a price to pay, actually. If you bought it by what so often are the present-day American standards of value — size and weight — the car sold for a song.



Believing in the efficiency of a plethora of cylinders, Schtunke settled for an in-line 12 of 24,966 cc, with catastrophic valve-gear. This novel method of exhaling the burnt gases came from his dislike of the idea of leaving the exhaust valves dangling in the searing exhaust stream, if it could be avoided. Through the use of an ingenious system of six interconnected springs, the exhaust valves pivoted at a point  $1\frac{1}{4}$  inches from the valve head and swung up into a slot cut into the cylinder head. This made for long-lived exhaust valves, but also for extremely short-lived springs, despite the rather low revolutions at which the engine turned: in 6th gear 1000 rpm gave exactly 72.4 mph. About every 2000 miles new valve springs had to be installed. Since the engine was padlocked to all but factory mechanics equipped with the master key, the expense incurred in shipping a man over to England was quite considerable. This padlocking is possibly what gave rise to the rumor concerning the sealing of the engine of the Rolls Royce, another rather good car. Then with the job taking, at the very minimum, 45 hours, you undoubtedly can see that it wasn't the cheapest of cars to maintain. However, pater was frightfully generous.

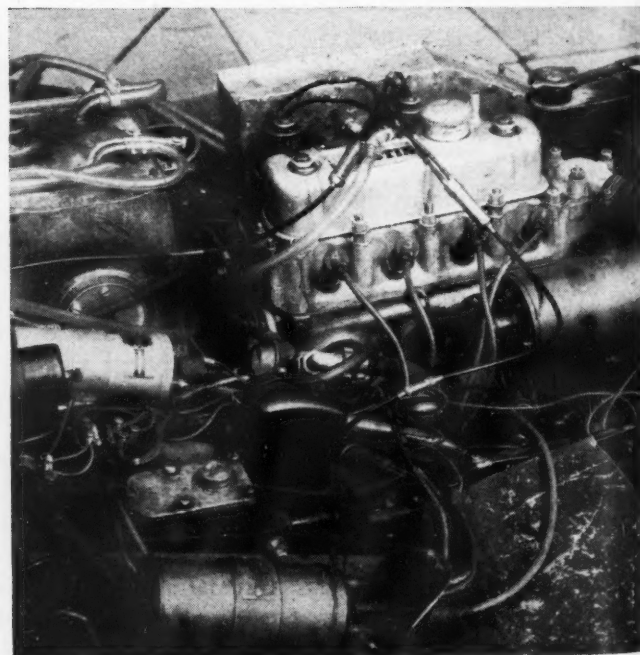
"Why so long to replace valve springs," you ask? "Pulling my leg," you murmur? Far from it, I assure you. You see, the Schtunke's engine, frame and body were cast in one single unit. With the block, head, manifold and exhaust pipes all cast *en bloc*, the springs had to be extracted in a devilishly tricky manner through each of the 12 exhaust (Continued on page 90)



## Speedwell GT Sprite



The cockpit of the Speedwell GT Sprite has a let's-get-down-to-business aspect with its wood-rimmed wheel, additional dials and switches on dash.



Wiring and tubing writhes around the 70 bhp Sprite engine shown here with Amal carburetors, cold air box, two coils. Note spare fuel tank.

► Small-capacity engines and congested roads have been responsible for the establishment of a remarkable number of hop-up shops in the British Isles, one of the most successful being Speedwell Performance Conversions Ltd. Starting life three years ago with the development of modest engine and suspension conversions for BMC A-series cars, Speedwell has now expanded into the "Abarth" class by producing a special-bodied, 70-bhp version of the Austin-Healey Sprite which is now invincible in British 1000 cc races and was recently timed by the Belgian RAC at 110.9 mph (SCI, August, 1960).

Like Abarth, Speedwell picks everyday, "bread-and-butter" cars for its transformations, turning what can only be described as rather ordinary machines into extremely individual, high-performance vehicles for very reasonable cost.

In the case of the GT Sprite, several stages of tune are available and a variety of optional extras can be added, according to the use to which the car is to be put—racing, rallying or road transportation. Externally the car bears more resemblance to a Lotus Elite than a Sprite, not surprisingly, since the Speedwell front body section and permanent hardtop were designed by Frank Costin, for some years Lotus aerodynamics consultant. The aluminum hood incorporates standard headlights, parking lights, and turn indicators but is hinged at the front and can be opened or closed without any of the physical exertion involved on a standard Sprite. The hardtop features a compound-curved windshield, a wraparound rear window and removable side-screens, use of the standard doors prohibiting the fitting of wind-up windows without a dramatic price increase. The rear deck is standard and provides the same roomy but rather inaccessible trunk as a normal Sprite.

Getting in and out of this coupe is like getting in and out

of a normal Sprite with the soft-top up: tolerably inconvenient. Once inside, however, there's adequate room and once under way few enthusiasts would give another thought to the subject. The car tested, which is raced almost every week-end and also used as a mobile test-bed, hardly comes up to concours standards as far as interior trim is concerned, but then the two just don't go together. Nor is weight reduction in the interest of performance compatible with padding and sound damping, so conversation becomes almost impossible over 80 mph. However, production conversions intended for touring have carpets and ashtrays and are if anything quieter than standard Sprites, and they still go almost as well as VP 7.

One subject on which the Speedwell bodywork defies criticism is rigidity. There are no rattles from hood or top on VP 7, even though the former is secured only by two spring catches—one at either side—nor is the top prone to the drumming experienced with some fiberglass conversions. There are occasional thuds at the rear, probably from the battery, mounted in the trunk for best weight distribution, but otherwise the car feels taut and tough—as a racing machine should.

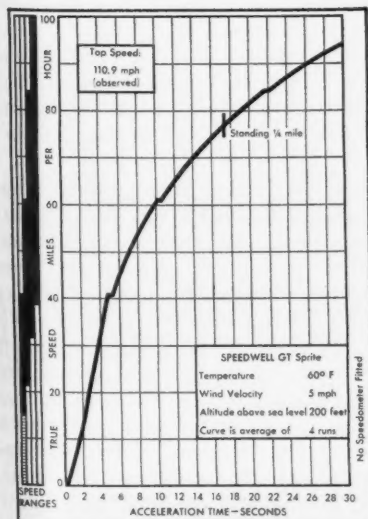
From the accompanying graph the fact that the Speedwell Sprite goes considerably better than a standard one can be detected easily. What might cause more concern is the car's ability to stop, or to corner at the elevated speeds of which it's capable. In the braking department surprisingly little has been done—nothing more than the fitting of Ferodo anti-fade linings, in fact. With such linings the hard pedal feel does little to promote confidence, except that the brakes pull the car up fair and square time and time again. Otherwise it would never have recorded the (Continued on page 83)

## ROAD TEST

### SPEEDWELL GT SPRITE

Price as tested: Approx. \$2600, POE New York

Manufacturer: Speedwell Performance Conversions Ltd.  
763 Finchley Road  
London N.W. 11, England



#### ENGINE:

Displacement ..... 59.8 cu in, 978 cc  
Dimensions ..... Four cyl, 2.52 x 3.00 in  
Compression Ratio ..... 10.5 to one  
Power (SAE) ..... 70 bhp @ 6800 rpm  
Torque ..... 60 lb-ft @ 5000 rpm  
Usable rpm Range ..... 2600-7000 rpm  
Piston Speed  $\div \sqrt{s/b}$  ..... 3120 ft/min  
@ rated power  
Fuel Recommended ..... Super Premium  
Mileage ..... 25-30 mpg  
Range ..... 175-210 miles

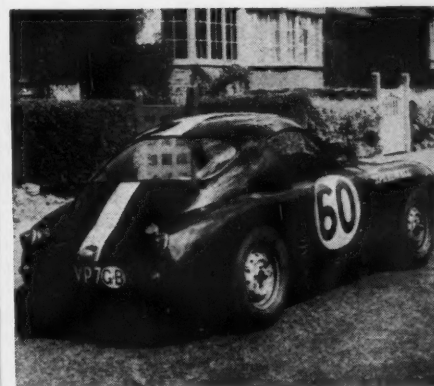
#### CHASSIS:

Wheelbase ..... 80 in  
Tread, F, R ..... 45 1/4, 44 1/4 in  
Length ..... 142 in  
Suspension: F, ind, wishbone and coil, anti-roll bar, R, rigid axle, quarter elliptic leaves, radius arms.  
Turns to Full Lock ..... 1 1/4  
Tire Size ..... 5.25 x 13  
Swept Braking Area ..... 110 sq in  
Curb Weight (full tank) ..... 1340 lbs  
Percentage on Driving Wheels ..... 52%  
Test Weight ..... 1676 lbs

#### DRIVE CHAIN:

Gear	Syncho?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	3.30	—	15.03	4.5
1st	No	2.57	53%	11.69	5.8
2nd	Yes	1.68	36%	7.65	8.8
3rd	Yes	1.23	23%	5.61	12.0
4th	Yes	1.00	—	4.55	14.9

Final drive ratios available: 3.73, 3.89, 4.22, 4.55, 4.875, 5.125, 5.375



# how to do your own VALVE JOB

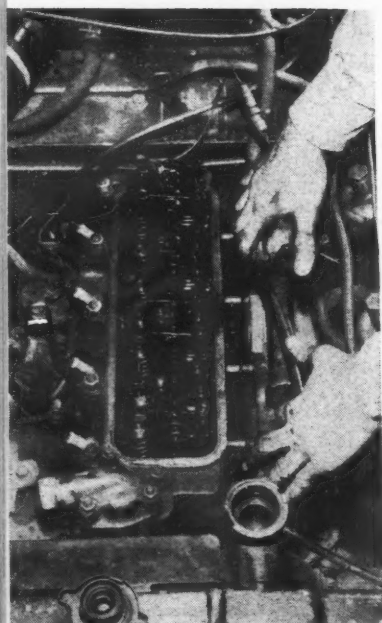
by Joe Petrovec

Is your engine suffering from "tired blood"? Try this do-it-yourself home recipe for rejuvenation.



**1** Check the reading on a compression gauge. The oil can may be used if worn rings are suspected. Squirt a liberal amount of oil into the cylinder, being careful not to hit the valves. If a low reading is still evident, a leaking valve is the cause. To start the valve job, drain the water from the radiator and block and disconnect the top radiator hose, water temperature bulb, spark plug wires and gas line. Remove the valve cover and gasket. Unhook any heater hoses and the vacuum advance tube if it's attached to the head.

Disconnect the intake and exhaust manifolds. It might be wise at this point to unhook the carburetor linkage since you will want to remove the carburetor (or carburetors) for service later in the process. If you have an old, unserviceable set of spark plugs, install them in the head. If you have a tendency to forget what goes where, pack small parts in boxes or envelopes and label everything. It's pretty embarrassing to finish a job with a few "extra" parts left over.



**2** In this car (an MGA) the intake and exhaust manifolds may be separated from the head, which can be withdrawn by itself. This holds true for Austins, Triumphs, Hillmans, Volvos and Renaults too. On the Sprite, the Austin-Healey 100-4, the Austin-Healey six-port and the Healey 3000, it's simpler to remove the head, carbs and manifold as a unit. To do this, disconnect the fuel line, throttle linkage, vacuum advance line and exhaust pipe.

A little calculating will tell you if it's easier to remove the manifolds and carbs with the head or the head alone. Measure the distance between the carbs and the nearest fixed part of the car. Then measure the stud lengths. If the stud measurement is longer, remove the head and manifolds as a unit; if the stud length is shorter, leave the manifolds in the engine room. Accessibility of the nuts and bolts is a factor to be considered too. In cars like the VW or Porsche, the entire power unit should be removed from the car at this point.

► Like any automotive engines, the four-cylinder power plants installed in the majority of sports and economy cars require a periodic internal cleaning out—decarbonizing—to retain their "factory-fresh" feel. Because of their limited displacement, a slight power loss or engine miss is likely to be more noticeable than, for example, in a big V8. Properly fitted and adjusted valves and carbon-free combustion chambers can help keep the mills running sweetly right up to the red line, developing all the power engineered into them.

The gasoline engine derives its power from heat energy generated by combustion of fuel in its cylinders. Gas vapors produce not only this heat energy but deposits that cling to the inner surfaces of the engine. These are commonly called carbon. As the engine operates, carbon accumulates and, in time, it will interfere with engine performance if left unchecked. Deposits on valve heads restrict their cooling and may cause them to burn, warp or crack. Carbon on valve seats may prevent proper seating and cause a compression loss. Valve stem deposits may retard the valves' free movement. Uneven compression readings, faulty valve operation, poor gas mileage, pre-ignition and a general "tired blood" feel may all be symptoms of excessive carbon.

Other indications of too much carbon may include overheating, even though the cooling system and timing are in proper order. Another may be running on, that is, continuing to fire after the ignition is switched off. This is usually caused by glowing carbon particles igniting the next charge of fuel. If you find you have to use premium-grade gasoline in an engine designed for regular, too much carbon may have raised the effective compression ratio. Discharge of sparks from the tail pipe at night is another clue to carbon. And if too much carbon is affecting valve seating, you may find it impossible to time the engine properly.

A compression gauge is one of the positive means to check for carbon. It will indicate leaking valves which may be due to these deposits. Bring the engine to normal operating temperature, then remove the spark plugs. Connect the gauge to number one cylinder and crank the engine with the starter. Make note of the highest reading recorded on the gauge and repeat the operation on the remaining cylinders. If the readings vary no more than 5 to 7 psi between cylinders, the compression may be considered normal. A very high reading points to excessive carbon, while a low reading indicates compression loss.

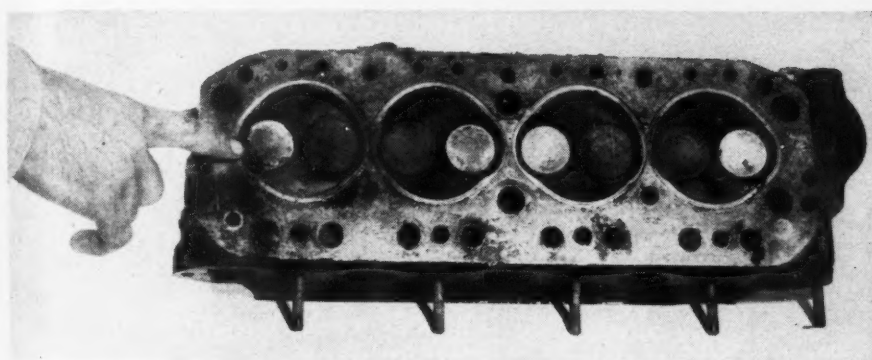
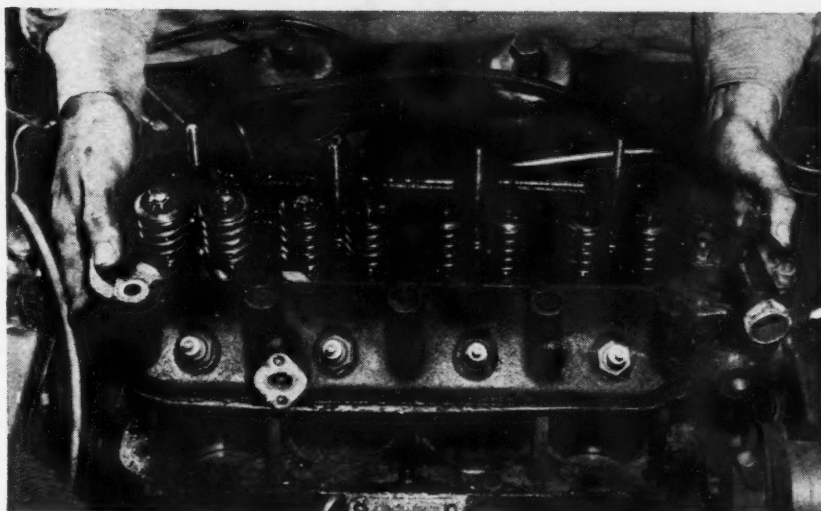
If the intake manifold on your car has a tap or plug, you can connect a vacuum gauge. At an idle, an engine in good condition will read 17 to 21 inches at sea level and will drop about 1 inch per 1000 feet increase in elevation. Low, uneven readings indicate poor compression or ignition. If the gauge pointer is jerky in its action, it indicates a sticky or burnt valve or valve clearances that are too tight. If the hand vibrates as the engine is revved up, weak springs may be evident. At anything above an idle, a burnt or leaking valve will cause the pointer to drop back about 5 inches each time it functions.

All these are merely guides to indicate the probable presence of carbon and the need for a valve job. In the final analysis, the only way you'll know for sure is by removing the head and taking a look. If your car has 20,000 or so miles on it and has never been touched, it's a pretty safe bet it can use a valve job. This doesn't necessarily mean you'll have to replace anything. Perhaps all that will be needed is a little cleaning up. A valve job is the most elementary of overhauls and should be considered a part of your normal preventive maintenance plan. The effort and money expended will more than pay for themselves in rejuvenated performance and restored economy. For the procedure to follow, refer to the accompanying photos and the final installment of the series in next month's SCI. A shop manual for your car would also be a worthwhile investment.

—JP

**3** After unbolting the rocker arm assembly by slackening each nut evenly, a turn at a time, lift it off the cylinder head after having made sure to disconnect the oil feed pipe if there is one. Note the arrangement of the rocker arms now; it will simplify reassembly after you take the unit apart for cleaning. Next remove the pushrods, being careful not to unseat the tappets. If you should accidentally unseat a tappet you'll find, with most modern engines, that it's extremely hard to seat it in its guide once again. Store the rods in their respective positions so they can be replaced in the slots from which they were withdrawn.

Unscrew the head retaining nuts, each a turn at a time. It's strongly recommended that you use a box wrench or a socket since they minimize the likelihood of stripping a nut, something that can't be said for an open-end wrench. To free the head from the block, tap each corner with a hammer, cushioning the blow with a block of wood. When the seal is broken, lift the head evenly off the studs. Examine the head gasket for evidence of compression loss due to a poor seal.



**4** The exhaust valve indicated here is burnt and cracked. Carbon buildup is evident in all of the combustion chambers. The exhaust valves are more likely to be found in need of major overhaul or replacement since they are subjected to higher operating temperatures and more corrosive chemical action than the intake breathers. All of the carbon scale in the head will have to be scraped clean to restore like-new performance.

The valves too will have to be serviced; you will have to give attention to the valve guides and piston crowns, and the valve springs will come under review. There's not much you can do to prevent carbon accumulation other than keeping the car in tune and running it fast once in a while.



**6** This shows why decarbonizing is desirable and necessary. From left to right, there are a carboned, pitted exhaust valve, a carboned intake valve and, for comparison, a new intake valve. Note how the carbon coats not only the face and head but has left some deposits on the stem as well.

These deposits block smooth gas flow, retain undesirable heat and may affect the seal of the valves in their seats. The carbon may take the form of fluffy or oily soot, but chances are everything exposed will receive a thick coating.



**5** Use a valve spring compressor to remove the valves, springs, retainers and oil seals. Make sure the spring seats firmly in the compressor; if it slips out you will find it has considerable force as it flies apart.

In the case of the MGA, above, there are two springs per valve. The split ring retainers fit into a notch in the valve stem and spring pressure holds the unit together. The circlip acts as insurance against things coming unstuck. Note the neoprene O-rings which must be replaced on each valve. They serve to limit the amount of oil that might leak through the valve guides into the cylinders. They go below the split retainers.

**7** The valves can probably be resurfaced if they are not cracked, bent or pitted. First clean carbon from head and stem. Some mechanics consider it false economy to reface valves. Taking off too much metal thins the head and may make valve prone to warping or burning. Check your car's specifications for the proper seat angle if you have valves ground.

Replacement valves cost about \$2.50 for most popular engines; refacing is about 75¢ per valve. If you replace one exhaust valve, replace all. Intakes rarely need to be replaced. (The final installment in this story, next month, will deal with decarbonizing the head and pistons and reassembly of the engine. We'd advise you wait for it, buy needed parts and do it over a weekend.)

T E D

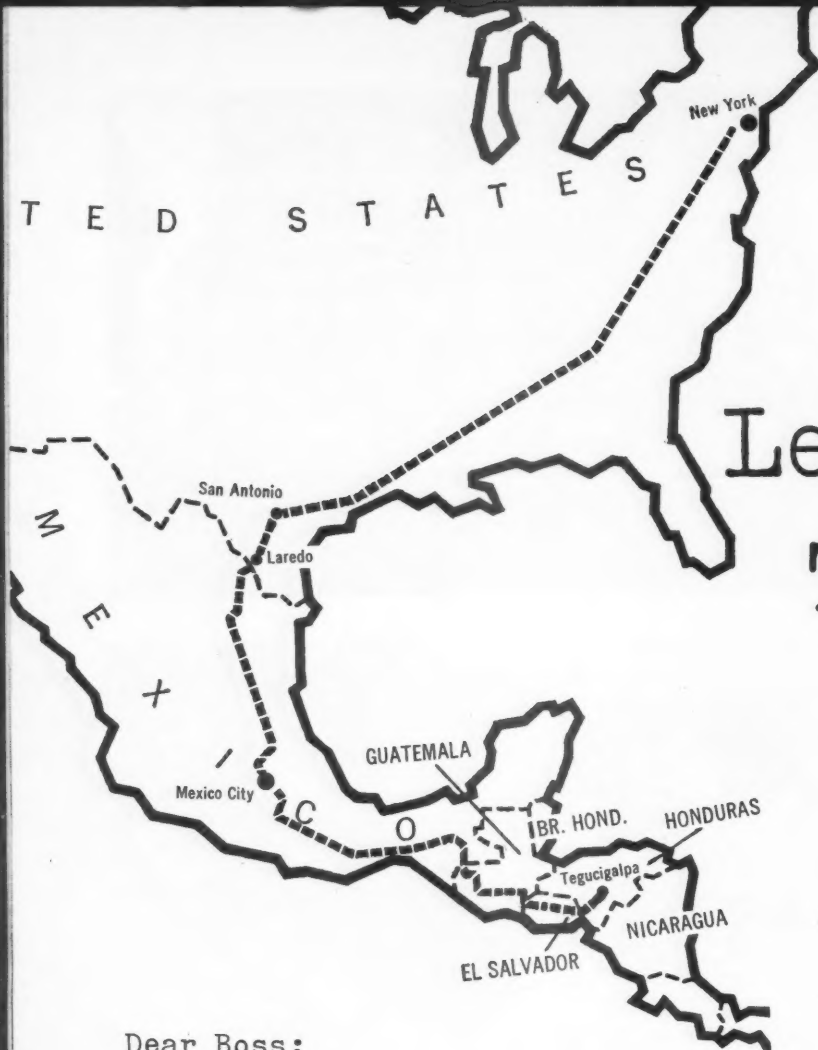
S T A

T E S

New York

# Letter from Tegucigalpa

by Don Typond



Hotel Lincoln  
Tegucigalpa, Honduras

Dear Boss:

Well, they said it couldn't be done. "Drive a Peugeot from New York City to Tegucigalpa in ten days? Never happen, G. I." But we did it . . . well almost.

The car was a brand-new Peugeot station wagon, with a mere 600 miles on the odometer when we picked it up. It had been equipped with what was considered to be all the essential items for a trip of this type, even though no one who planned it had ever done it. Included in the list were such items as a five-gallon gas can, a five-gallon water can, two surplus entrenching tools, a flashlight, a dime-store compass, a length of what someone inaccurately called tow rope, a case of motor oil, and three cartons of spare parts. With the exception of three quarts of oil and the flashlight, we didn't have to use any of the stuff. During the next 5000 miles, though, we thought of a few things that should have been included.

I made the trip with Hal Hennesey, who seems to make a specialty of zany jaunts like this. Remember his trip to Alaska in a Morris? Anyway, I picked him up at his house at 10:00 a.m. on a Thursday, and we started out on the great adventure.

We were scheduled to stop at the Peugeot service center in San Antonio, Texas, sometime on Saturday for a thorough check before

(Continued on page 78)



*Detour around landslide*



The braceless Ford ↗  
 ← No "name brand" gas here!  
 The filter was an old  
 felt hat. This was  
 southern Mexico.

Constant hazard both  
 night and day. Same  
 in Mexico, El Salvador,  
 Guatemala and Honduras ↘



↗ Immigration office at the  
 Mexico - Guatemala border.





62/SPORTS CARS ILLUSTRATED/NOVEMBER 1960

## Road Research Report: RENAULT Caravelle



► The dictionary definition of "caravelle" might be significant. It's described as "... a small vessel with broad bows, high poop and lateen sails ...". The light blue Renault Caravelle we tested could *vraiment* be described as a little dreamboat; it does have a broad bow and a relatively high rear deck—but no lateen sails, just a snug, waterproof convertible top in tough black canvas. For those who haven't yet heard the word, the Caravelle was first designated the Floride. But for reasons best known to the management at the sprawling, 61-year-old Regie Nationale in Billancourt, it was changed to Caravelle for the U.S. market. In August, 1959, SCI published a road test, conducted in France, on the Caravelle coupe. There have been some detail changes, but the car analyzed here is virtually the same as the one given a brief shakedown cruise last year. Only recently, however, have Caravelles become readily available to new-car purchasers.

From its dulled razor blade styling at the front to its Italianesque rear end, the (Ghia-designed) Caravelle has arresting styling features combined with French practicality. There are, however, none of the gimmicky devices that have been found in some French products. The LST-like prow sweeps between the two deeply-recessed headlights. Its drop-door covers the spare tire and carries the front license plate. Released by a pulling inside the luggage compartment, this shroud hinges downward allowing the spare, held in place by rubber shock cord, to be easily removed, even by a girl. This design feature, carried over from the Dauphine, is a noteworthy solution to the knotty problem of storing the spare. It doesn't devour cargo space and there is no need to unload the trunk to get at it.

### PROTECTION AND LIGHTING

The front bumper offers a modicum of protection to the front sheet metal and echoes the line of the leading edge of the hood. The trunk is huge (8½ cubic feet) for the size of the car and is upholstered with a durable-looking soundproofing material which is glued in place. It also carries the 12-volt battery (which, incidentally, has neatly-designed plastic connectors that hold a quantity of grease to minimize corrosion) and the brake fluid reservoir—both well away from engine heat—as well as the windshield washer (standard equipment)

reservoir. Its lid hinges forward, unlike the Corvair's or VW's, and cannot be claimed to be much more accessible for loading packages when parked nose-in at a curb than a car with the trunk in the rear. The lid release lever is located inside the cockpit, thus minimizing the possibility of thefts.

The front fenders, in addition to bearing the headlights, carry turn signal/side light units at their leading edges. The latter lights are visible from a point fairly rearward, an aid to signaling cross traffic. Also each fender has the Dauphine crown mounted above the belt line. There is an on-off-on, three-position switch on the steering column to illuminate these for parking in accord with European regulations. The rearward half of the perimeter of these badges is red, while the leading edge is white. Just forward of the parking lights is shiny script proclaiming you drive a Renault (left side) Caravelle (right side).

Continuing, externally, the doors have push-the-knob-to-open rotary latches which work with light pressure, yet stay shut securely. There are no inside door locks, but both doors will lock from the outside on the ignition key, which also locks the engine compartment. Both doors have arm rests.

### EXTERNAL GARNISHES

The only side windows in the Caravelle convertible are the two in each door, which move in an easy, positive way. Small no-draft vent windows also work smoothly and seal tight. The main side windows are unframed, giving the Caravelle an uncluttered appearance with the top down (although the top in its up position does not at all detract from the car's appearance). The only obstruction from bow to stern is the windshield, which is moderately curved and engenders a minimum of distortion. It's sharply raked—enough so that it catches reflections of the plastic steering column and the dash lights at night. The windshield is topped by full-width crash padding and supports two amber-tinted sun visors which are curved so they won't project above the top line.

Aft of the doors are low-mounted air intakes for the water-cooled engine. Each vent is finished with five decorative metal strips adding interest to the smooth flank line. The rear fenders blend into Italian-styled

(and fabricated) tail lights which have separate bulbs for stop light and tail light/turn signal units. The wave-motif rear grille is not out of context with the name, but is also not out of danger of ramming since the overriders are low in protection potential. Viewed in profile, the only dis-unified item appears to be the exhaust pipe which contorts itself to a point under the deep-wraparound rear bumper. Perhaps this is the result of using the stock Dauphine muffler in a body to which a considerable (10 inches) overhang section has been appended, but the outcome is a tailpipe which sometimes scrapes coming out of driveways.

#### REMARKABLE ROOM

In the cockpit, one notices the seats are essentially Dauphine, covered in two-tone leather cloth. In ours, the wear surfaces were light blue, which soiled fast but which could be cleaned easily with a damp cloth. In warm weather we found ourselves sticking to the seats. They are firm and comfortable, even for long distances, but have no lateral support. Both seats have screw-type rake adjustments, not conducive to changing *en route* but far better than no choice at all. When unoccupied, the passenger's seat is kept from flying forward under hard braking by spring clips. Both seat backs pivot forward to permit entrance to the *tres intime* rear occasional seat. This, we found, is not only ample for three children, but can carry two adults on a 120-mile jaunt without undue discomfort either with the top stowed or erected. There is by no means a plethora of legroom, but it's bearable if you're game (no pun intended). With the top up, the only complaint we found was that the rear top bow was in close proximity to one passenger's head, the proximity disappearing on some bumps. The rear seat back folds downward to convert the space to an additional six cubic feet of carrying volume for *la grande tourisme*.

The front wheel wells intrude somewhat into the leg space, causing an offset driving position and leaving marginal room between controls and to the left of the clutch. There were rare times when we scraped a foot on the steering column while clutching or braking and with the lower portion of the column unshrouded, it was an especially peculiar sensation when turning the wheel. Sometimes, too, we found ourselves stabbing for the roller-type accelerator but hitting the heater, a fragile-looking but apparently sturdy plastic unit. The heater, incidentally, spread heat evenly throughout the cockpit and over the windshield. In addition to the outlet near the trunk "firewall," there was a slot at the lower edge of the rear seat. Air is cleaned by a removable filter in the heater unit in the engine compartment. A two-speed dash-mounted switch controls the intensity with which the warm air is emitted. Two controls on the outlet housing direct the air stream to the interior, the windshield or both.

#### TAKE THE WHEEL

The steering column blossoms into a two-tone wheel, the portion from the dash to the wheel being shrouded with a light-colored plastic that threw annoying re-

flections on the windshield. The wheel hub sports a "gold" crest, similar to others found on the radio insert cover, the shift knob and the cigarette lighter. The horn and headlight switch is mounted *a la* Dauphine on the left of the steering column. The beep-beep/boop-boop horn selector switch is there too. On the right is the self-canceling direction signal switch, this one made of metal with a plastic knob, a welcome change from the limp plastic stalk used on the Dauphine. The lower edge of the metal dash is padded over its width. Above this area, the vertical portion carries the gold-tone switches which looked pretty gaudy against the light blue paint.

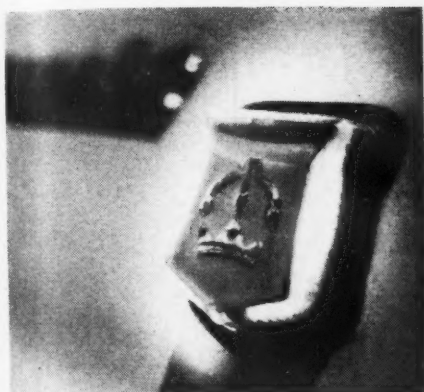
The speedometer, which has no tenths-of-miles column or resettable odometer, is located in front of the driver in a nacelle which also holds warning lights for the oil and battery. The indicator lights are covered by a transparent celluloid. There were times, when the top was down and the sun at our back, that it appeared the battery was not charging and that the oil had suddenly evaporated. But then we cocked our head, and in its shadow, the lights "went out." Perhaps use of a translucent plastic would prevent this. The upper horizontal plane of the dashboard, which holds a large ash tray, was painted a dark but shiny blue. There was no padding here nor on the lip that divided this area from the portion below. At the far right was the glove compartment which would hold a couple of pairs of gloves. Two fair-sized door pockets and two pockets sewn in near the occupants' feet added places for carrying items. The snap fasteners used to hold the rear seat back either upright or flat are but two of many used to clip the top cover in place. Despite the bushel of clips used, two are lacking where needed and the cover does flap a little.

#### A CONFIDENT FEELING

The Caravelle we tested was shod with Englebert tires, and Michelin X's are optional. With the recommended 14/23 front and rear tire pressures, the car had a heavy steering feel, exhibited quite a bit of tire squeal and was generally mushy to drive. But jacking the pressures up to 20 and 29 psi changed the feel considerably and for the better, without stiffening the ride extremely. The car tracks nicely and isn't unduly affected by cross winds. In fast bends, the rear-end weight bias makes itself felt, but is predictable and easily controlled. To driver and passengers, there is no obvious lean and the driver feels confident at all times. As will be noted from the Steering Behavior graph, Renault has given the Caravelle an impressive amount of designed-in understeer. The ride over bumps is smooth and pitching is at a minimum, thanks in large measure to the softer Aerostable suspension. The Caravelle cruised nicely over rural byways in the 55 to 60 mph range. The third gear ratio is well-chosen and offers respectable flexibility if not blazing performance. At cruising speeds, the steering is positive and not too heavy but has a strong self-centering action. In the

(Text continued on page 84; data overleaf)

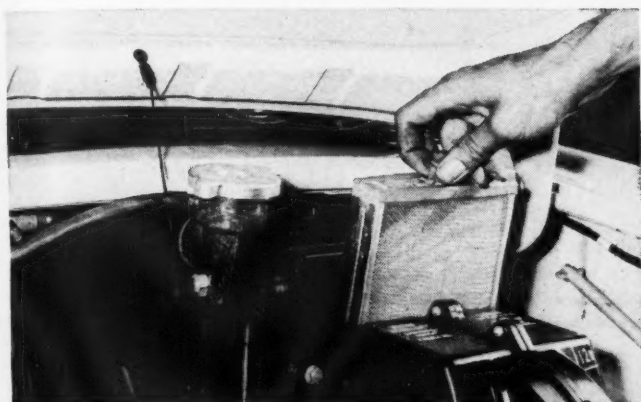
PHOTOGRAPHY: TYPOND



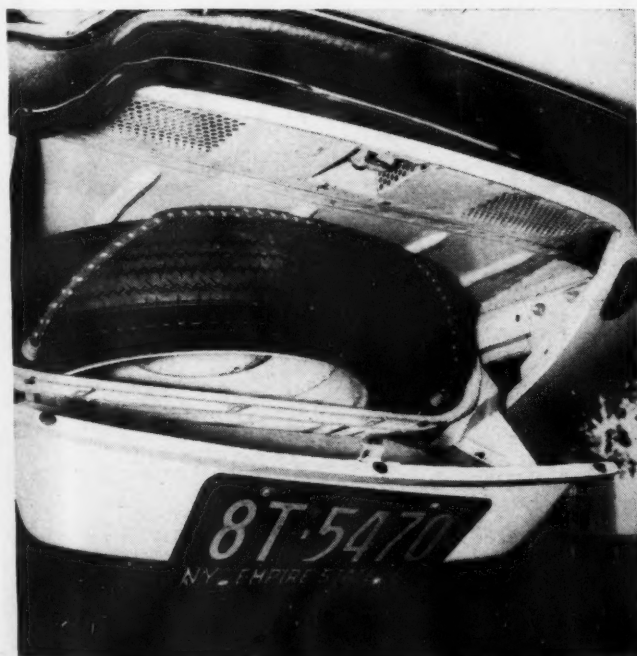
The illuminated front fender ornaments are typical of attention to detail in the Caravelle.



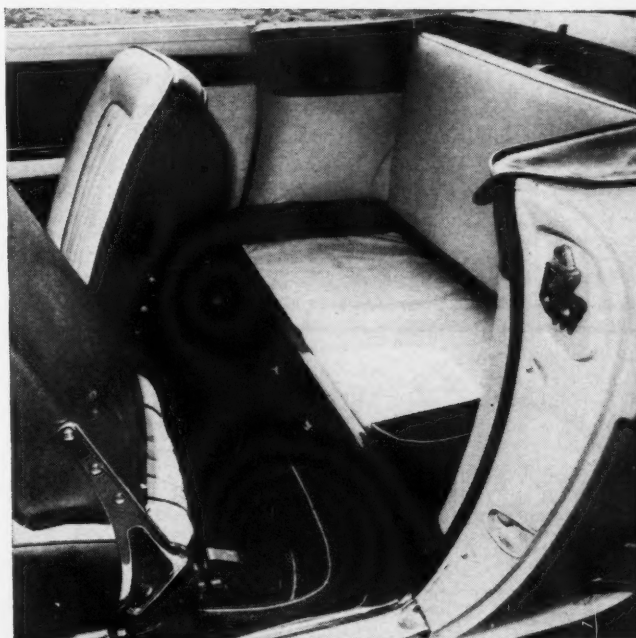
While primarily intended as a two-seater, the Caravelle has room for five people and two balloons, although leg space is at a premium and front seats must be kept well forward for comfort in the rear.



The heater has an air filter which can be removed for cleaning; the water filler hinges as hood's closed and jack handle doubles as crank.



The spare mounting's handy. Fresh air flows through perforations at front to a duct which takes it to two air cleaners at the carburetor.



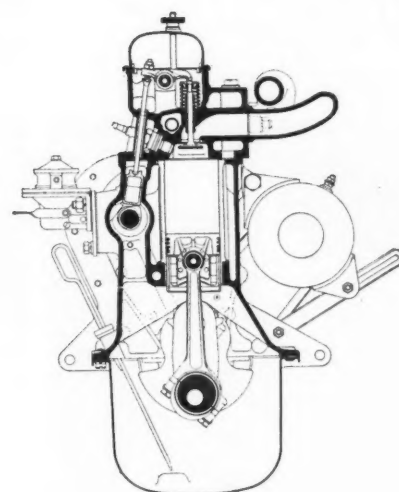
The back cushion of the rear seat may be folded flat for carrying luggage and there's a heater outlet near the floor. Front seat backs adjust.



Trim rear end of the Caravelle could use more grille protection. The hole under the bumper is for the crank, and the engine compartment lid locks.

# Road Research Report: RENAULT Caravelle

Price as tested	1000	\$2495	7000
Displacement	51½ cu in		320
Power (SAE)	40 bhp		320
Curb Weight	1000	1730 lbs	4000
Swept Braking Area	100	158 sq in	400
Weight on Driving Wheels	35		59% 65
Wheelbase	70	89 in	130
Piston Speed, "corrected"	1000	2240 fpm	4000
Speed @ 1000 rpm in Top Gear	10	15.3 mph	25
Mileage	10		34½ mpg 40
Importer:	Renault, Inc.	750 Third Avenue,	New York 17, N. Y.



1/8 SCALE

## ENGINE:

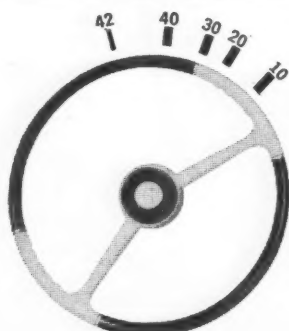
Displacement	51.5 cu in, 845 cc
Dimensions	Four cyl, 2.28 x 3.15 in
Compression Ratio	8.0 to one
Power (SAE)	40 bhp @ 5000 rpm
Torque	47.7 lb-ft @ 3300 rpm
Usable rpm Range	1200-5900 rpm
Piston Speed ÷ √s/b	2240 ft/min
Fuel Recommended	Regular
Mileage	31-38 mpg
Range	260-325 miles

## CHASSIS:

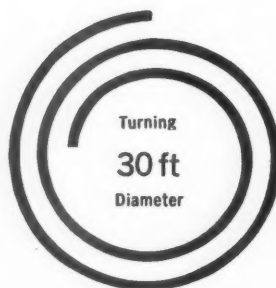
Wheelbase	89 in
Tread, F, R	49, 48 in
Length	168 in
Suspension: F, ind., wishbones, coil and air bag;	
R, ind., swing axle, coils and air bag.	
Turns to Full Lock	2¼
Tire Size	145 x 380 (5.50x15)
Swept Braking Area—drum	158 sq. in.
Curb Weight (full tank)	1730 lbs
Percentage on Driving Wheels	59%
Test Weight	2060 lbs

## DRIVE TRAIN:

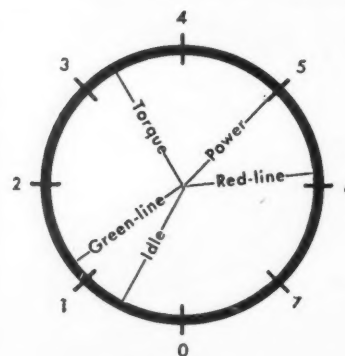
Gear	Rev	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
		No	3.70	—	16.2	4.3
1st		No	3.70	76%	16.2	4.3
2nd		Yes	2.10	44%	9.18	7.5
3rd		Yes	1.46	42%	6.38	10.8
4th		Yes	1.03		4.50	15.3
Final Drive Ratio: 4.37 to one.						



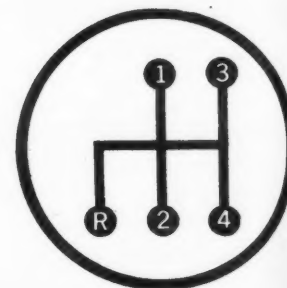
14/23 psi, F/R  
Steering Behavior



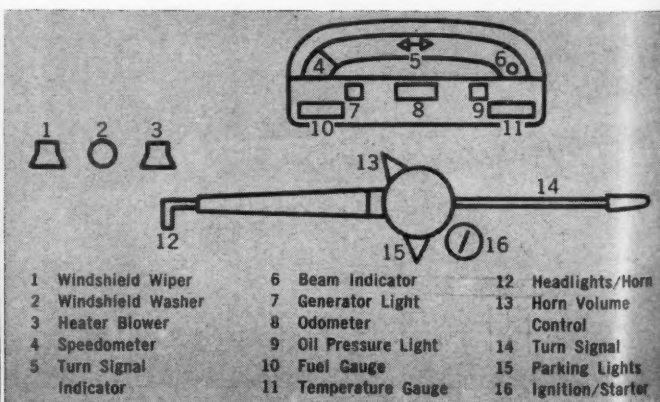
Turns to Full Lock



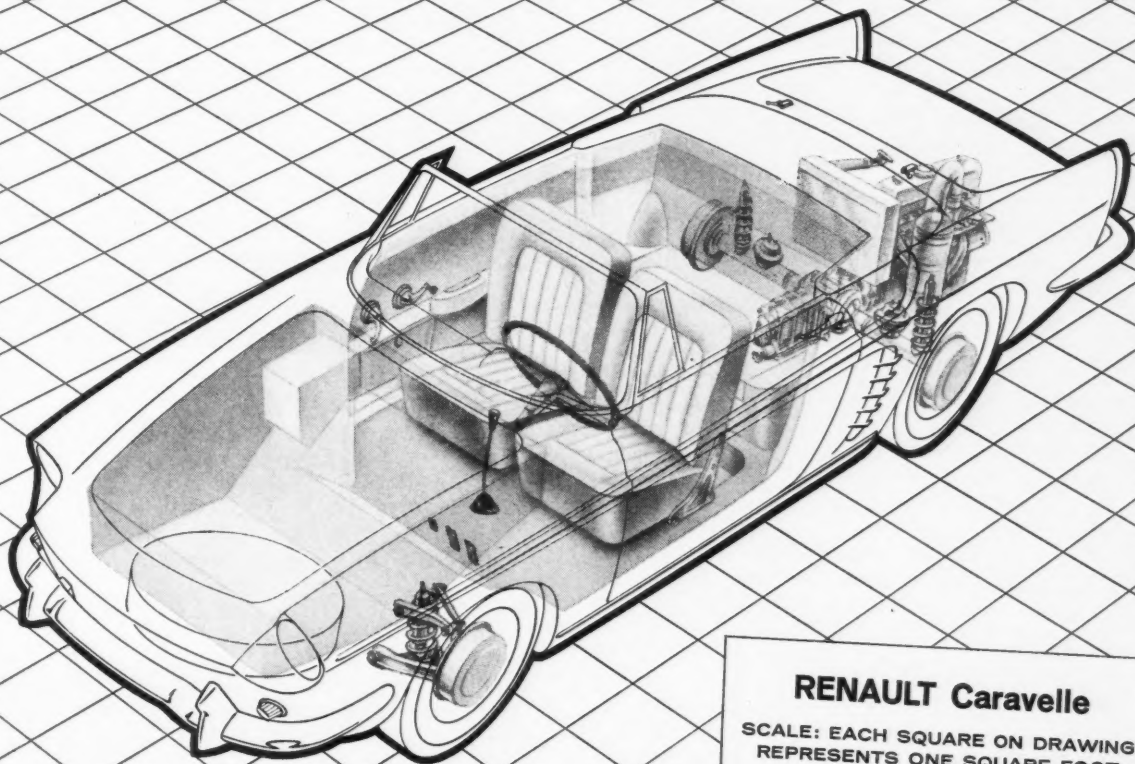
Engine Flexibility



Shift Pattern



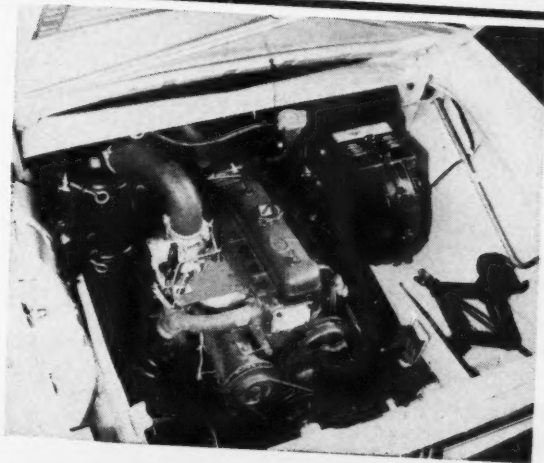
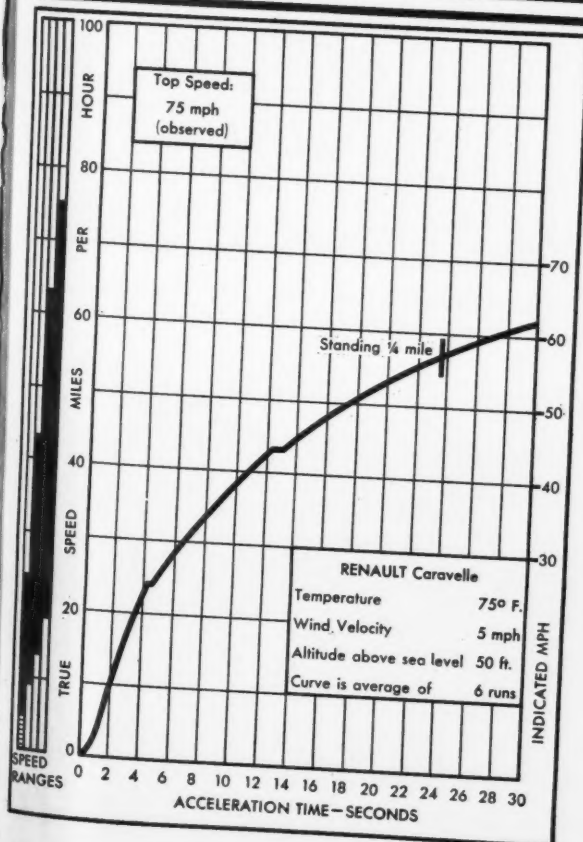
- |                         |                      |                     |
|-------------------------|----------------------|---------------------|
| 1 Windshield Wiper      | 6 Beam Indicator     | 12 Headlights/Horn  |
| 2 Windshield Washer     | 7 Generator Light    | 13 Horn Volume      |
| 3 Heater Blower         | 8 Odometer           | Control             |
| 4 Speedometer           | 9 Oil Pressure Light | 14 Turn Signal      |
| 5 Turn Signal Indicator | 10 Fuel Gauge        | 15 Parking Lights   |
|                         | 11 Temperature Gauge | 16 Ignition/Starter |



### RENAULT Caravelle

SCALE: EACH SQUARE ON DRAWING  
REPRESENTS ONE SQUARE FOOT

SPORTS CARS ILLUSTRATED  
T•E•FORNANDER



► Spectators at British motor races get more for their money than anywhere else in the world. Proof of this was July's British Grand Prix at Silverstone. The day began at 10:15 a.m. with a 25-lap unlimited sports car race, followed at 11:30 by a 25-lap Formula Junior event, followed at 12:45 by a 12-lap production touring car race, followed at 1:20 by a "G.P. drivers' 5-lap Mini-Minor demonstration", followed at 2 p.m. by a 5-lap "historic racing car demonstration". Finally, miraculously only ten minutes behind schedule, the 13th R.A.C. British Grand Prix for Formula 1 cars was allowed to start.

The race will go down in the books as further evidence that a B.R.M. can be made to go, with Graham Hill upsetting the balance scales by almost winning the race. The car was a fast one, Graham had confidence in it and "tigered" as hard as he could, but with the race in his pocket, cockpit error lost it for him.

Half an hour before the scheduled start of the Grand Prix, Stirling Moss arrived by helicopter from his London hospital to start the race. Looking amazingly well considering that not even a month had passed since his Belgian crash, Stirling did a lap of honor around the circuit standing in a Land Rover, then mounted a podium to drop the flag.

In front of him on the first row of the starting grid were two B.R.M.s and two Coopers: Graham Hill and Jo Bonnier in the Bourne cars, Brabham and McLaren representing the Surbiton stable. Champing at the bit in the second row were Trips (Ferrari), Gurney (B.R.M.), and Ireland (Lotus). Having received full instructions from Earl Howe as to the proper technique in dropping the flag, Stirling did the job perfectly, but the same couldn't be said for all the boys on the front row of the grid.

Seconds after the start had been given, Graham Hill's B.R.M. was still motionless, the second time he had difficulty in getting off the mark on two successive race weekends. This time he stalled the engine; in the previous race at Rheims the clutch wouldn't disengage and he was unable to get into first gear. But a squad of B.R.M. mechanics rushed up and pushed him off, the engine catching hold almost immediately, and Graham charged away chasing the pack.

Jack Brabham went into the lead from the start, followed by McLaren, Bonnier and Ireland. From fourth place on his first lap, Welshman Innes Ireland pushed his Lotus into second place by the fifth lap. Bonnier suddenly dropped back as motorcycle-racer John Surtees carved his way through the field in another Lotus. But coming up madly from behind was Graham Hill's B.R.M. By 37 laps and half distance he was second behind Brabham and closing steadily. The distance narrowed to nil on the 54th lap and as Brabham led down "Hangar Straight", the B.R.M. in his slipstream, Graham pulled out and passed Jack on braking for Stowe corner.

With the dark-green B.R.M. now in the lead, Brabham resigned himself to second place, for there was just nothing he could do about the situation. The Australian champion was driving as hard as he could and was a sight to watch, sliding in true Brabham fashion through the corners, head low and charging. Faces in the B.R.M. pit were tense, with Berthon and Mays and Alfred Owen himself not daring to believe that Graham could actually pull off the win in such fantastic fashion after such a horrible start. His wife Betty silently worked over her lap chart, fingers crossed, Graham's progress a terrific surprise for her. Having seen him pushed off last, she had resigned herself to another uneventful race with B.R.M.s falling by the wayside. But as the leaders started their 72nd lap with only five to go, the yellow caution light began to blink on and off. Someone had spun. Quickly the word came over the loudspeaker

(Continued on page 77)

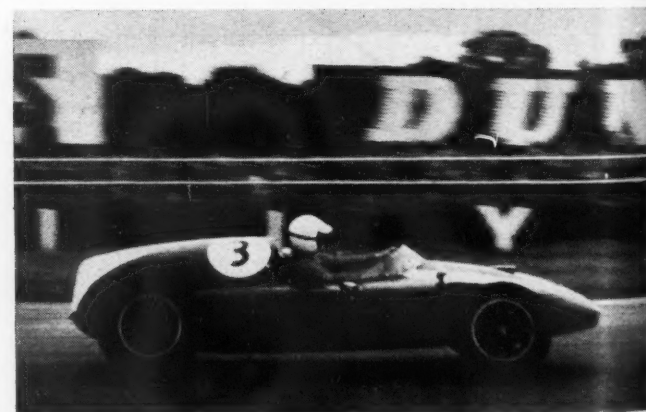
## COOPER COPS A CLOSE ONE

by Jesse Alexander

Graham Hill and his flying B.R.M. had the British G.P. wrapped up and sold until lap 72, when one slip ended a terrific drive.



Quiet competence of motorcycle champion John Surtees earned him a solid second place. His drive was overshadowed by the epic Hill-Brabham duel.



American on his own. Chuck Daigh looks relaxed in cockpit of his 1959 factory Cooper. Blown engine on 58th lap ended his consistent effort.

# BRITISH GRAND PRIX

July 16, 1960, Silverstone

77 laps, 2.9 miles per lap

1	Brabham	Cooper-Climax	2:04:24.6 (108.69 mph)
2	Surtees	Lotus-Climax	2:05:14.2
3	Ireland	Lotus-Climax	2:05:54.2
4	McLaren	Cooper-Climax	1 lap behind
5	Brooks	Cooper-Climax	1 lap behind
6	von Trips	Ferrari	2 laps behind
7	P. Hill	Ferrari	2 laps behind
8	Taylor	Cooper-Climax	3 laps behind
9	Gendebien	Cooper-Climax	3 laps behind
10	Gurney	B.R.M.	3 laps behind
11	Trintignant	Aston Martin	5 laps behind
12	Piper	Lotus-Climax	5 laps behind
13	Naylor	Cooper-Maserati	5 laps behind
14	Gregory	Cooper-Maserati	6 laps behind
15	Munaron	Cooper-Ferrari	7 laps behind
16	Clark	Lotus-Climax	7 laps behind

Fastest lap: G. Hill, B.R.M., 1:34.4, 111.62 mph.

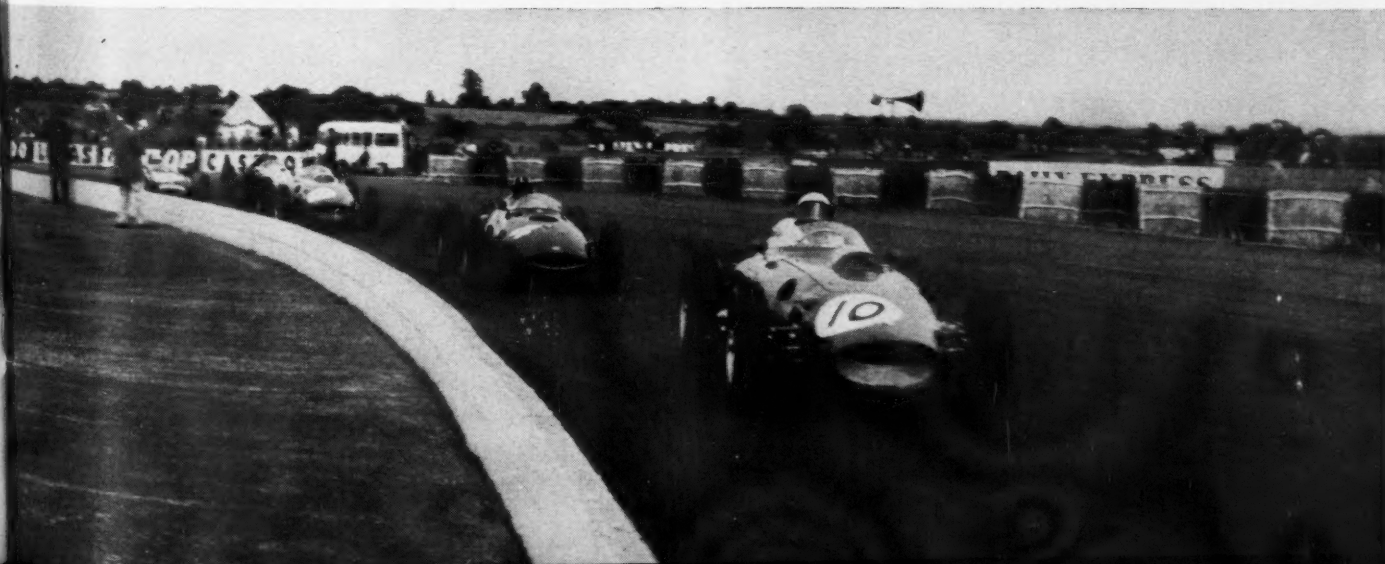
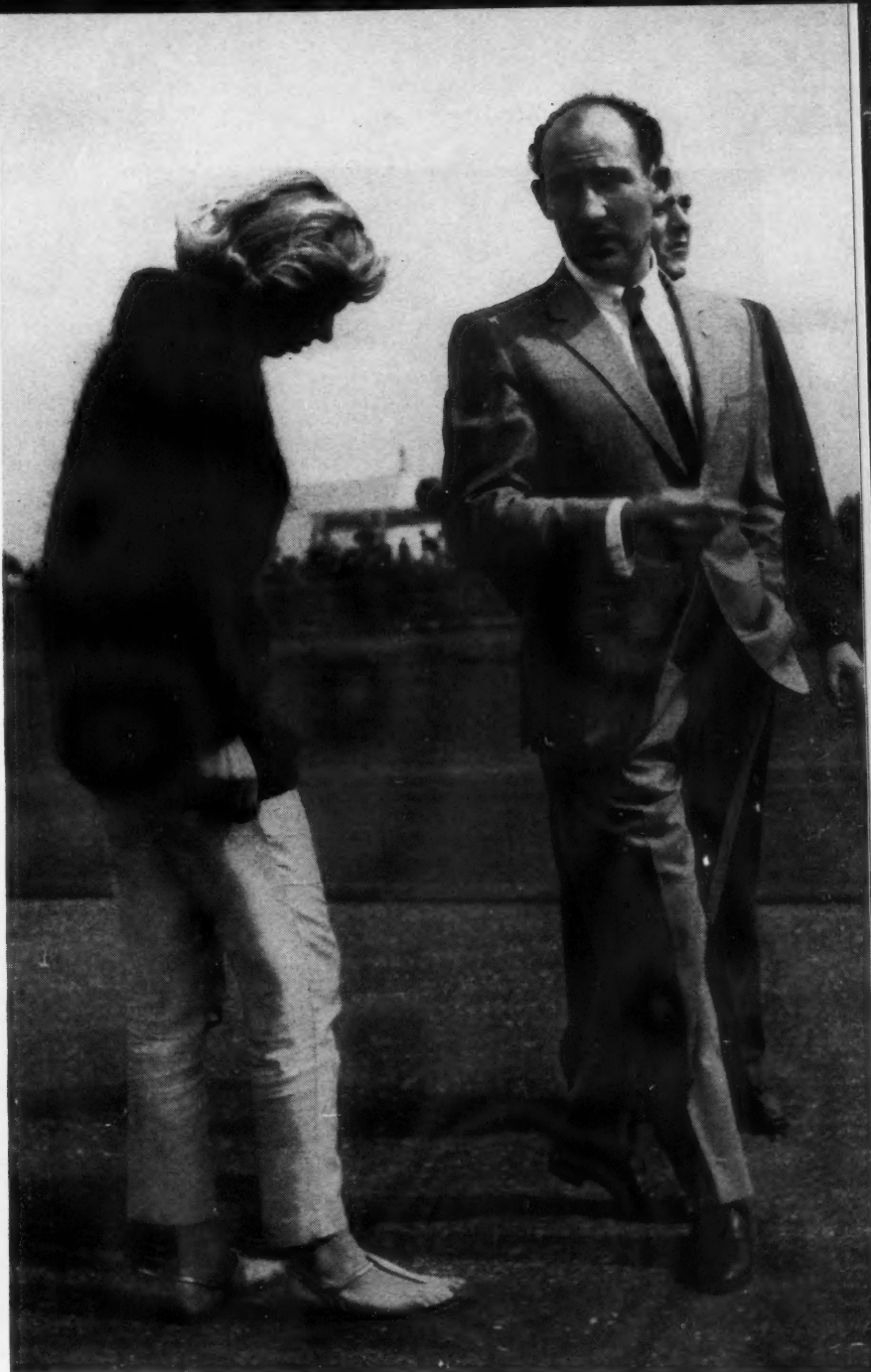


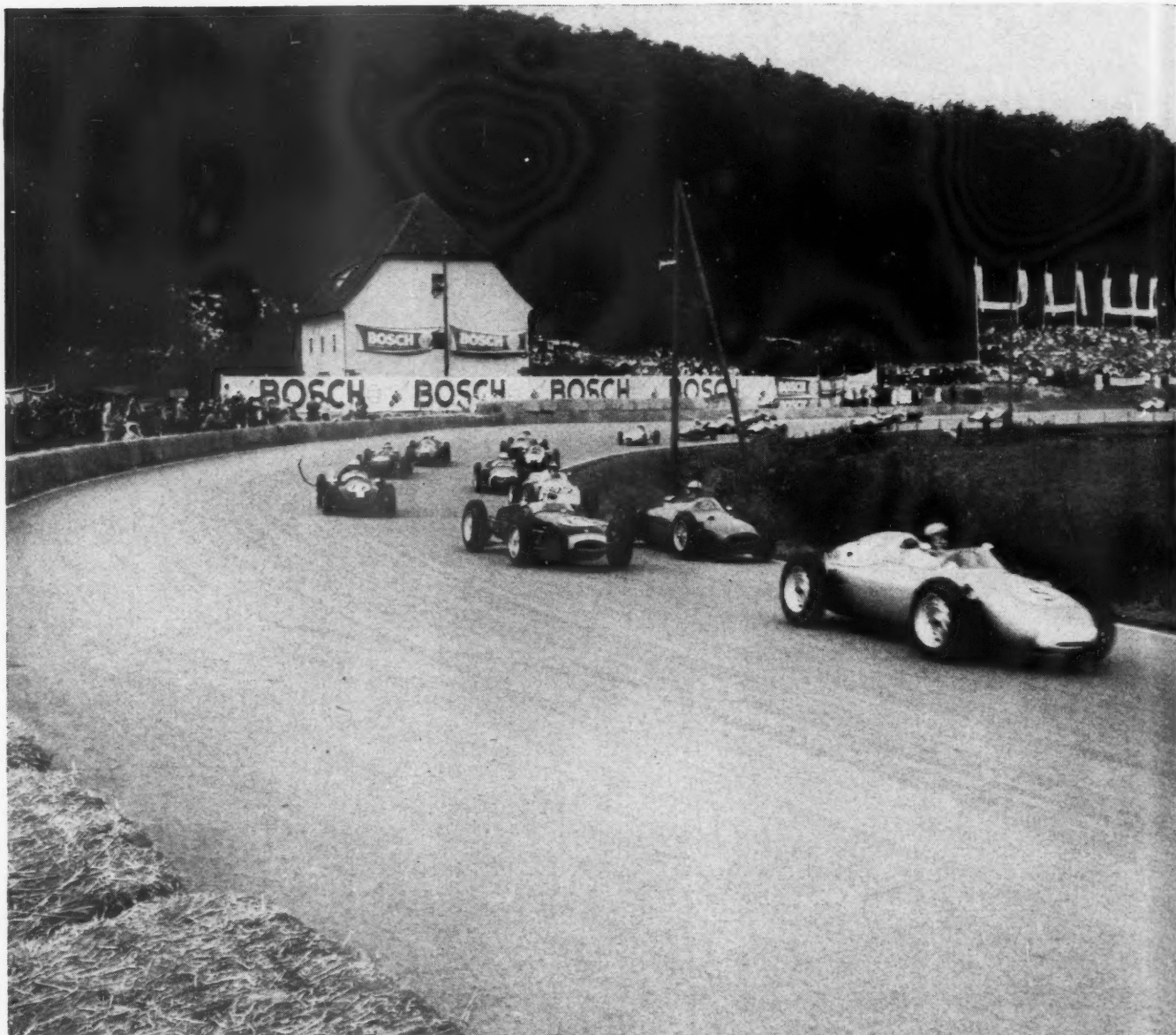
A World Champion under pressure. Brabham is a study in fierce concentration as he chases Graham Hill's B.R.M.

MC CABE

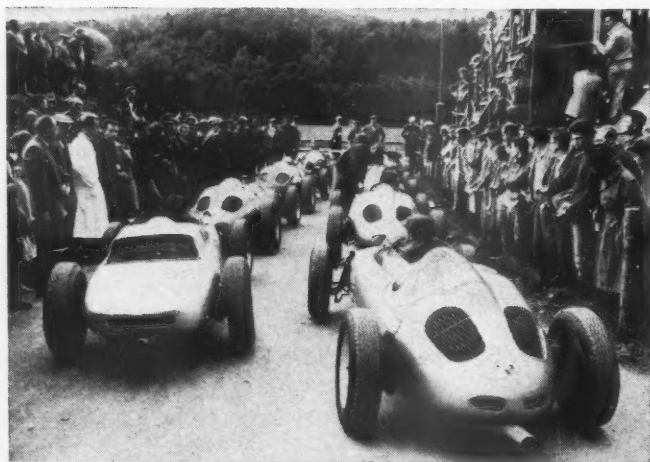
Graham Hill provides the meat in a Ferrari sandwich as he dogs Phil Hill and in turn is tailed by von Trips.

A dapper Stirling Moss walks towards Beckett's Corner with blonde friend. He proved a volatile spectator, waving cars on and shaking an admonishing finger at erring drivers in the bend.

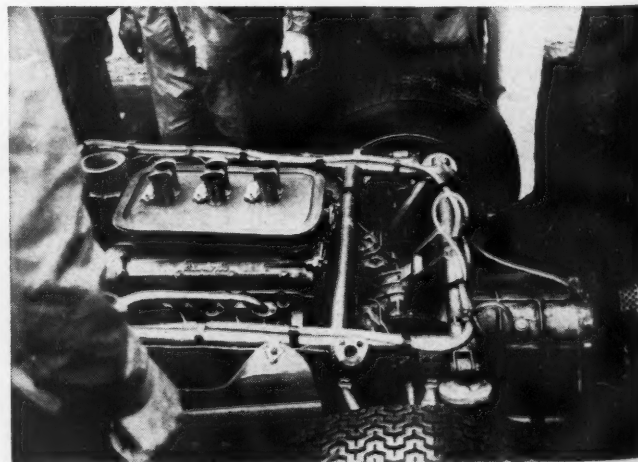




Brief lead is enjoyed by a Porsche Formula 2 car at Solitude. Von Trips in the Ferrari (inside second row) gave notice that Italy will compete in '61.



Ferry Porsche, Jr. designed squarish bodywork for otherwise-unchanged F.2 Porsche seen waiting for practice with stablemates at Solitude.

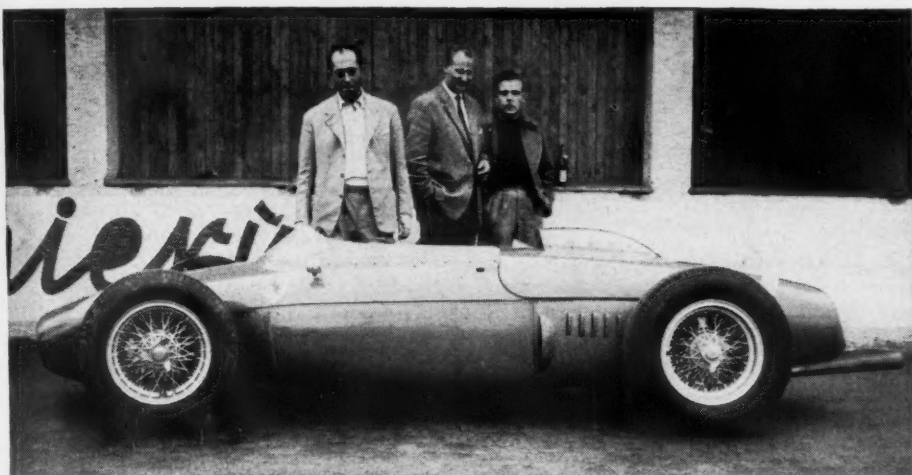


F.2 Ferrari uses overhung gearbox with open-air clutch, as first used on F.1 car. Dunlop disc brakes are placed inboard at the differential.

## A GLIMPSE INTO '61

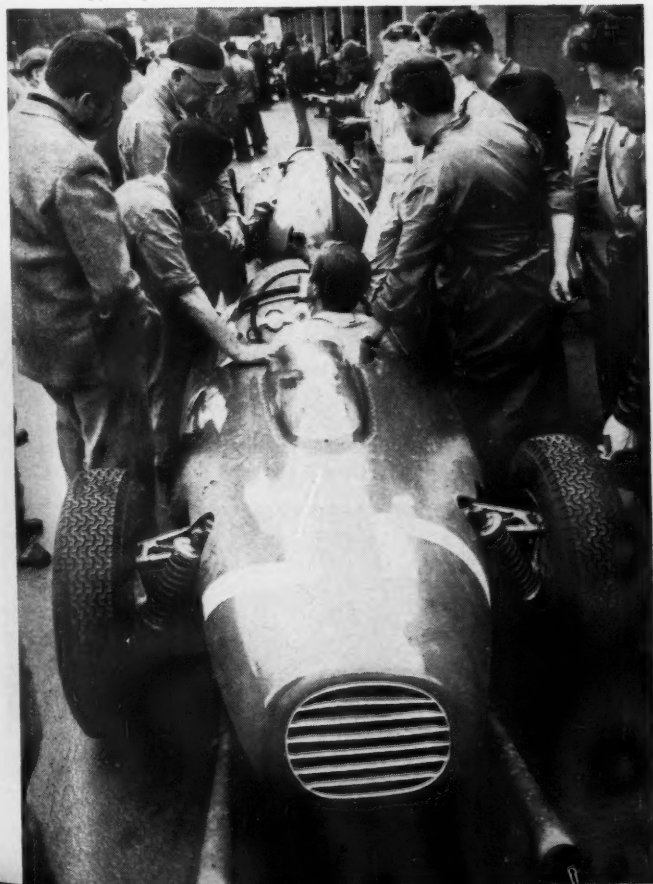
by Jesse Alexander

Because of the strictures imposed by a new and disliked formula, the 1961 Grand Prix season may be one of new cars and different circuits.



Driver sits lower in Formula 2 Ferrari than in original 2½-liter car.

At 165 bhp, its power output is the highest of today's 1500 cc machines.



► In spite of heavy criticism from many quarters, it looks like we're stuck with the new 1½-liter Grand Prix Formula whether we like it or not. Actually, things are shaping up very well. With the exception of Aston Martin, whose racing shop is about to close its doors, all the English competitors will be fielding Formula 1 cars next year.

We've already had a foretaste of things to come in this year's 1½-liter Formula 2 Championship series, which involved five events: the G.P.s of Syracuse, Brussels, Pau, the Aintree 150 Miles, and the G.P. of Germany, which was held on the Nürburgring's seldom-used *Südschleife*, or short, 4.8-mile south section, on July 31st. Until this last event, Cooper seemed to have the Formula 2 Championship in the bag, with 25 points to Porsche's 18. The Stuttgart firm had to win and also take second or third spot in the German G.P. to come out on top. This they duly did with a massive entry of five cars. This was the finishing order after a rather dull race: Bonnier (Porsche), von Trips (Porsche), Brabham (Cooper), Graham Hill (Porsche), Herrmann (Porsche) and Barth (Porsche).

Porsche must have breathed a sigh of relief when Ferrari decided not to take its new rear-engined car to the 'Ring after it scored a convincing win over all comers in the previous weekend's non-Championship Solitude Grand Prix — right in Porsche's stamping grounds, just north of Stuttgart! It was as if Porsche had come down and beaten Ferrari on the Modena Autodromo.

The photos on these pages show the latest Ferrari and some of the other new machines that turned up for the Solitude race, which was run in the dry after two rainy practice days. Having just won the curtain-raiser Formula Junior contest, Jim Clark climbed into another Lotus and set off to lead the Formula 2 race for many laps until head gasket trouble brought him in. After that, Trips walked away with the race in the latest Ferrari, whipping it through Solitude's fine mixture of fast and slow bends at a winning average just short of 100 mph.

Manufacturers' plans for 1961 are still, naturally, in a state of flux. Lucky Casner of Camoradi, who entered Herrmann's Porsche at the German G.P., has been encouraging Maserati to go ahead with a new 1½-liter single-seater; here's hoping he succeeds. Work is going ahead at Coventry Climax on a short-stroke four and a V8, and B.R.M. is also said to be trying the V8 route to power a new chassis with outboard disc brakes. Porsche's attitude, as SCI mentioned last month, is one of "wait and see" on the question of horsepower.

To ensure that the 1961 Formula 1 cars have maximum spectator appeal, I hope the organizers of some of the little-used but exciting circuits like Rouen, Clermont-Ferrand and Pau will be able to schedule F.1 events. The newly-extended Brands Hatch course in England would also be ideal. The R.A.C. of Belgium is already planning to run its G.P. in Brussels next year. Even though the Drivers' Championship will be decided in the smaller cars in '61, there will also be plenty of spectator and participant interest in races for the bigger Intercontinental Formula cars if they're staged on faster tracks like Rheims, Monza and Spa. The complaints notwithstanding, 1961 looks pretty good from here.

—JLA

# EAST AND WEST MEET NORTH AND SOUTH

by Dic Van der Feen

Top drivers from all points of the compass converged on Road America for a truly national series of races.

► The first professional sports car race at Road America began like this:

The starter on Augie Pabst's pole-position Scarab ground 'round and 'round; Red Byron and assorted Meister Brauser mechanics frantically coaxed and played patty-cake on intake ram tubes; the eight assorted pistons went up and down without benefit of combustion; the temperature needles of 41 other machines on the grid started climbing; starter Larry Whiting began turning redder than his sunburn, and alongside Pabst, in 6½ liters of Old Yaller Mark II, Carroll Shelby tilted his head back and roared, sympathetically but hilariously, at Pabst's discomfort.

At the last possible moment, just short of being pushed off to the side—and with an unprecedented sense of good theater—the Scarab coughed to life, the green flag went down and Old Yaller disappeared, followed immediately by Pabst, four Birdcage Maseratis, eight Porsche Spyders, four Ferraris, three Listers, two Echidnas, another Scarab, and enough additional Corvette-powered specials to fill the GM Proving Grounds with glee. In short, it was the most truly national array of top-quality modified machinery yet brought together in a U.S. event.

The driver quality matched the machines', with Pabst and Shelby supported by Jim Jeffords, Skip Hudson, Bill Krause, George Constantine, Roger Penske, Jim Hall, Bob Holbert, Rodger Ward, Loyal Katskee, John Kilborn, Canada's Peter Ryan, Don Sessler, Jack Ensley, Harry Heuer, Bud Gates, Don Skogmo, Lloyd Ruby, Charlie Kolb, George Reed, Bill Larson, Ed Grierson, and Harry Entwistle.

The finish wasn't quite so good as the start, chiefly because it came 200 miles later; a 100-miler might have seen a multi-car deadheat. But there were some corking moments between start and finish in this mid-Summer USAC-F.I.A. gathering of the best from East and West. Some of the finest moments were of sheer anticipation, well before the start, as drivers who seldom meet greeted each other and cars that have never shared the same paddock were bedded down together.

There were, first of all, the ex-Scarabs—probably in the most potent condition of their illustrious career. The engines have now been punched out to 5.7 liters (348 cubic inches), significantly more than their former 5.5-liter (339-cubic-inch) form. Augie Pabst proved the extra inches were useful by qualifying his car for pole position with a nearly unbelievable lap time of 2'41.82", almost three seconds faster than the existing lap record.

The 2'44.80" record had been established by Pabst, driving the other Meister-Brauser-Scarab, in his terrific struggle with Dick Thompson (Sting Ray) at the June, 1960 SCCA Nationals. The new figure is made comprehensible only by the statements of Pabst and Thompson after the June race. Both said they had run throughout on seven cylinders. At this USAC event, after seeing Pabst lead a field of top drivers in top cars on a devastation of the old record, the June statements must be accepted at face value. And, certainly, thoughts of the Scarabs being an obsolete design may be laid to rest.

Young Harry Heuer kicked the other Meister Brauser-Scarab past the timers in 2'47.00", extremely respectable time; a year ago it would have been shattering.

Then there was Max Balchowsky's amazing Old Yaller Mark II (see SCI, August, 1960), never before seen east of Denver. International star Shelby, concentrating on the American pro circuit this year, booted this remarkable creation to a 2'43.12" qualifying time. The largest-displacement engine in sports car competition hauled Shelby around Road America's 13 turns with so much adhesion-busting torque in reserve that he used only third and fourth gears. Mechanics who towed the car from the Pacific became bored around Cedar Rapids, Iowa, took Old Yaller off the trailer, and drove it the rest of the way to central Wisconsin!

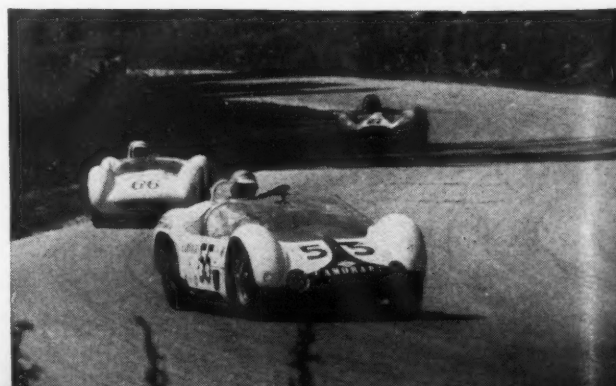
Partnered with Old Yaller was an equally rare escapee from California, Bill Krause's successful D-Jaguar with 320 cubic inches of Corvette V8 under the hood. A complete change of rod bearings and an item-by-item paddock tear-down of the engine failed to reveal the cause of a power loss that infuriated Krause. But the reputation was high and adjustments continued till post time.

The chief center of attraction was the Type 61 Maserati driven by Jim Jeffords. This was the "Birdcage With a Difference," the long-windshield, long-tail model driven for Camoradi by Masten Gregory at Le Mans this year. As one observer said in the Road America paddock, the windshield, extending from nose to cockpit in a near-horizontal arch of plexiglas, "was like taking the book of regulations and throwing it in the F.I.A.'s face."

The car had been flown over from the factory the week of the Road America race for the start of a Western Hemisphere career that should become famous. Officially entered in this race by Camoradi, the "streamlined" Birdcage was, in fact, owned by J. Frank Harrison of Chattanooga, Tennessee. The car is the opening wedge in a new international racing dynasty that Harrison is forming. The gigantic trailer and first-class equipment displayed at Road America give some indication of Harrison's seriousness. He already has a new, unused "spare" Type 61, has ordered others, will take delivery of one of the first 3.8-liter Maseratis, and will

(Continued overleaf)

Jim Jeffords herds the winning Le Mans Maserati around a Road America bend. Trailing are Jim Hall, Maserati, and Bill Krause, D-Jag-Corvette.



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With the big cars screaming up the hill in the background, Peter Ryan spins in his Porsche towards dust cloud raised by Holbert's already-exited RSK.

probably enter single-seater Formula racing next season. With Jeffords as number one driver and another top-flight pilot to be contracted, immediate plans call for competition at Riverside and Laguna Seca USAC events and at Nassau this year. Jeffords will co-drive the car in the 1960 Road America "500".

Jeffords squirmed his 6'3", 200-pound frame into the cockpit designed for Gregory and Chuck Daigh and recorded third fastest qualifying time of 2'44.53" — also under the lap record.

Three other Birdcages backed up the Le Mans car on the grid and, as it turned out, there was safety in numbers. Jim Hall of Dallas had a nearly new model, hoping to continue his remarkable 1960 run of successes. He qualified with 2'45.16", merely in the extraordinary class. Hall's former car was driven by Bob Schroeder of Dallas. Both Texas Maseratis were entered by Carroll Shelby Sports Cars, Inc. Impressive as the sixth best qualifier was the little-used Type 61 of Loyal Katskee of Omaha. Katskee competes strictly as a professional and had enjoyed scant opportunity to drive the Maserati in 1960 USAC competition.

Tucked among the big boys when qualifying was completed was astonishing Roger Penske whose Porsche RSK recorded the fifth best time of 2'47.08". Bud Gates and George Constantine filled the fourth grid line with Lister-

PHOTOGRAPHY: PERRIN



Curt Gonstead, winner of the 100-mile Formula Junior race, powers into a corner in Mitter-MBM car. Longest race yet for Jrs. proved exciting.

Corvettes. Skip Hudson was in the 1959 Ferrari team car belonging to John Fulp of Anderson, S.C. Krause, Bill Larson and Ed Grierson in Echidnas, Bob Holbert (Porsche RSK), Ryan (RS 60), Skogmo (3.8 D-Jaguar), Sessler (Porsche RS), Jack Ensley and John Haas in RSKs, and Honest John Kilborn in the new and monumental Hi-Tork Special of Rich Lyeth were among the 42 starters supporting the field. Of the 44 drivers and co-drivers participating, 33 were currently active SCCA pilots.

The Hi-Tork Special is of absolutely gigantic dimensions — high, wide, and long — and Kilborn was to retire it, sounding awful, on the second lap with the comment, "I've broken the Queen Mary!"

Rodger Ward had blown the RS 60 engine fitted to his RSK during weektime practice. A "hack" engine was hurriedly fitted for qualifying but as he fell nearly eleven seconds behind Penske and was six seconds worse than Holbert, the Leader Card Porsche entry was scratched and Ward shared the driving of Ensley's RSK.

After the improbable storybook start, Shelby boomed away to an immediate lead over Pabst that he stretched by two seconds a lap. Lap times for each, however, were in the high 2'40"s as Pabst hauled 53 gallons of fuel and Old

Yaller nearly as much while both drivers contemplated the folly of treating a 200-mile endurance run like a 50-mile sprint. Meister Brauser chief Red Byron told this observer before the start, "I told Augie to let Shelby go out and take a two-mile lead if he wants. Much as I'd like to see Shel and Max get a win, not this time, please. I can't believe that yellow thing will last." Byron paused, then added, "Of course, I don't think we will, either." Byron called the race perfectly.

Old Yaller whirled away (at \$50 per lap) without challenge to a 40-second lead by the 30th lap of 50. Pabst held 13 seconds on Jeffords. Krause, whose paddock work had paid off, mixed it up with Hall as they took turns filling Jeffords's rear view mirror in a three-car dice for 50 miles. Jeffords never relinquished second as Hall and Krause passed the fourth-place baton back and forth lap after lap. Krause's fine effort went *psui* as the pinion bearings in the special Halibrand rear end started an ominous howling on lap 12 and the West Coast hybrid was retired. Hall continued to haunt Jeffords past the 100-mile mark before the Camoradi car began to creep away.

Constantine, Heuer, and Katskee were next in this dazzling display of machinery. They trailed a mile behind the leaders with Heuer and Katskee in constant argument over sixth place. The best-attended struggle took place among the next batch where Hudson, Schroeder, Larson and Holbert staged a Ferrari-Maserati-Echidna-Porsche pressure party that held much of the crowd's attention. Holbert easily led the under-2000 cc class from Ryan after Penske's abrupt departure on the second lap with a destroyed clutch and an unshiftable transmission.

On the leader's lap 31, Shelby heard a big bang when he reached for fourth. The main transmission shaft had gone and suddenly it was Pabst's race with less than 20 turns to go. Lap times for Pabst, Jeffords, and Hall had drifted down to the mid-2'40" range as the gas loads lessened. Pabst had worked up a 15-second lead with some 2'44" laps as Jeffords resisted temptation and waited. He was wise. After less than 15 minutes in the lead, the drive train let go on the Scarab and Pabst parked at Station 13. Jeffords nodded appreciatively as he went into the lead, turned on a couple of fast laps, and settled down to a half-minute lead over Hall.

Constantine had made an unnecessary fuel stop while lying a comfortable fifth that probably cost him an eventual third. The Hudson-Schroeder-Larson-Holbert panic had now strung out and Constantine returned to war in ninth place to spend the final 80 miles clawing his way back past them for the major interest of the later stages. He was to lose all gears but top on the final lap as Hudson nipped him at the line for fifth place.

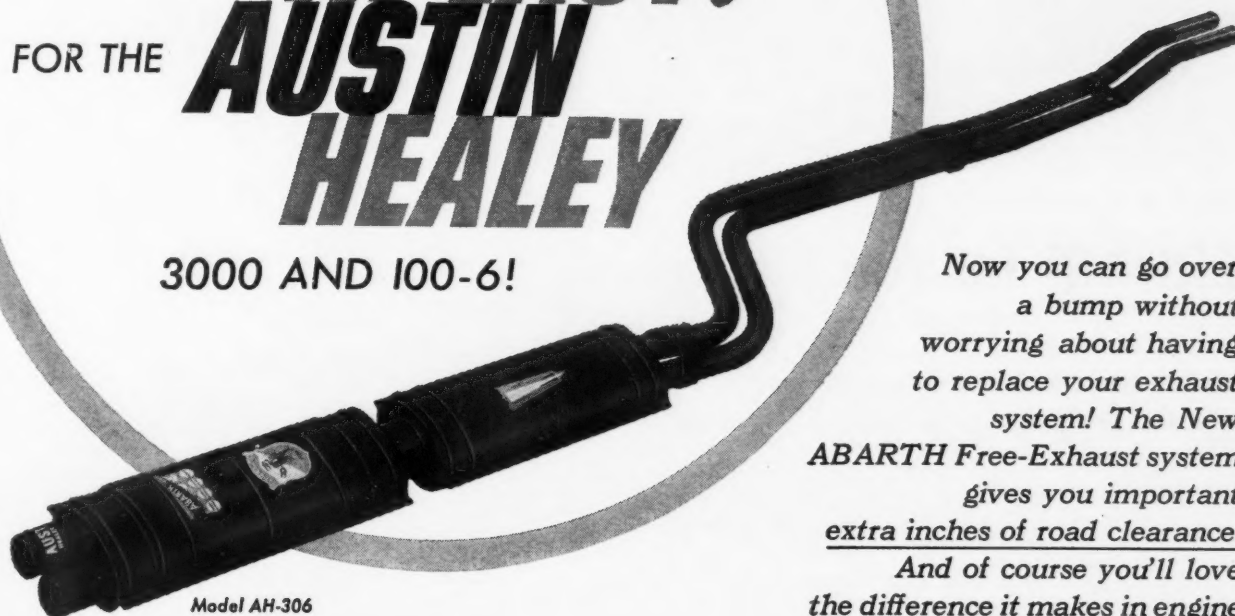
Katskee had finally shaken off Heuer in the best race of his career, and he contented himself with a distant third to the equally content Hall in second place. The latter slowed to 2'51" laps as Jeffords, shoehorned in his cockpit, won by nearly a minute in a car he had never had to push. His victory (at a rapid 85.495 mph) was Trintignant-like in its demonstration of good racing judgment and did much to silence the criticism, "He's just a good Corvette driver." He is much more than that. He led the one-two-three Birdcage finish, having lapped all other cars but Hall at least once.

The winner took home \$3650 in qualifying, lap, prize, and accessory monies. Behind him in overall order (accessory money omitted) came Hall, \$700; Katskee, \$525; Heuer, \$385; Hudson, \$315; Constantine, \$280; Schroeder, \$140; Holbert, \$500; Larson, \$105; Ryan, \$400; Grierson, \$70; Ensley-Ward, \$300; Gates, \$35; Haas, \$220; and 10 other finishers out of 42 starters. Shelby and Pabst won \$1625 and \$650 respectively in qualifying and lap monies. —DVF

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## FERRARI for the Masses

**A new, small-engined G. T. car might make many more Americans partisans of the prancing horse.**

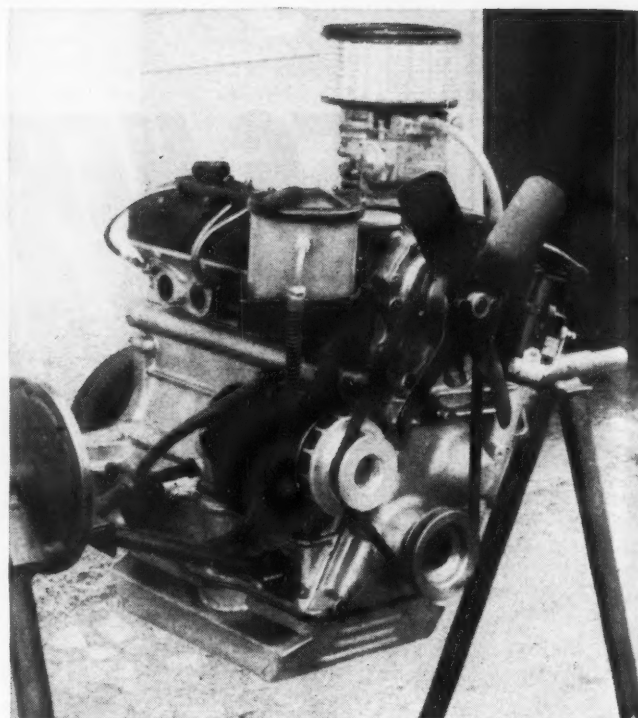
► The latest colt in the stable of the rearing black horse is an 850 cc "Volks"-Ferrari, shown here with a modified Fiat 1200 chassis and wraps by Pinin Farina. You will notice there is no outward indication that the car is a Ferrari—the traditional escutcheon having been replaced by what looks like a sheriff's badge and the grille device by a carbine—but take our word for it, it's a Ferrari all right.

Weighing in at 1560 pounds, the GTiny has an 87-inch wheelbase, a 50½-inch tread and 13-inch wheels. It's supposed to be good for a shade under 100 mph with the engine shown. The power plant is topped by an awesome-looking air cleaner and single Solex carburetor feeding into four individual intake ports on the left side. With a compression ratio of 9 to 1, the overhead-cam type 854 develops 75 bhp at 6800 rpm. The water-cooled in-line four has a bore of 65 mm and a stroke of 64 mm. Four separate exhaust ports finish off the right side of the engine. The unit is coupled to a four-speed transmission which has Laycock de Normanville overdrive on third and fourth speeds.

While details of the 854 are at best sparse, it would appear that in the typical Ferrari vein there is lots of room for power expansion. It's not difficult to envision multiple carburetors and tuned exhaust among outward changes. Internally too it's a safe bet there is plenty of potential built in. Coupled with feather-weight bodywork, the new Ferrari could produce exciting competition among the little 'uns like the Fiat-Abarth 850s.

We called this a Ferrari for the masses, perhaps an understatement since the 854 will sell for 1,600,000 lire or about \$2,600, but at such a price it may be expected to expand the Ferrari sales market while offering high performance in a small-displacement category. This is the only hitch: somebody has to be found to build the car in quantity, at least 3000 and preferably 5000 annually to meet that price, which itself seems highly optimistic, being less than the tab in Italy for a twin-cam 1500 Fiat.

—SCI



Despite the small size—65 mm bore and 64 mm stroke—the new four is all Ferrari. With a single overhead cam it develops 75 bhp at 6800 rpm.

PHOTOGRAPHY: FOTOCARS



No lack of carburetion here. Tiny Ferrari 854 uses big downdraft Solex carburetor mounted on manifold containing four separate intake ports.



## COOPER COPS A CLOSE ONE

Continued from  
page 68

system, "Graham Hill has spun his B.R.M. at Copse Corner and is returning to the pits on foot."

Soon a tragic figure appeared, trudging down the pit line, his face dirty and flushed and the back of his racing suit dark with sweat. As Brabham took the checkered flag, Graham told us what happened. "I simply lost it. Relaxed my concentration for a split second, got on the wrong line and that was it." A sudden variation in brake pedal "feel" may also have made Graham momentarily lose the intense degree of concentration that's necessary to get a G.P. car into the groove for an approaching corner.

During practice for the Formula 1 race, chief interest centered on the scrutineer's bay where Formula 1 and Junior Lotuses were being checked and double-checked to see that they were up to snuff. The special precautions were the result of a rear wishbone anchorage failure on a Formula Junior Lotus, and following this the scrutineers insisted that the camber adjustment nut be screwed all the way home where it anchors the wishbone to the frame. On the car in question it had been only partly screwed in, set for a particular camber angle, and had parted company from the

chassis — luckily with only moderate damage to the car and none to the driver. Thus all the Lotuses started the race as unknown quantities to their drivers, but remarkably enough it didn't seem to make any drastic difference in their handling. Ireland went well, finishing third, but surprise of the day was second-place John Surtees, his quiet, steady drive going almost unnoticed in the heat of the Hill-Brabham dice. This was only Surtees's second Formula 1 race. (SCI's September-issue biography of Surtees was in subscribers' hands just a week after the British G.P.—Ed.)

No surprise were the two outclassed Ferraris. Only two had been entered, conventional front-engined machines for Hill and Trips, no match for the English cars on their home ground. The rear-engined Ferrari had undergone lengthy development and was set to appear with a Formula 2 engine at Stuttgart's Solitude race the following weekend.

David Brown chose Silverstone for the second 1960 showing of his Formula 1 cars. Two started the race, driven by Roy Salvadori and Maurice Trintignant, one of them fitted with a new wishbone rear suspension. The experimental fuel injection engine had been pushed to the back of the race shop, both cars running on Webers. Handling was still not completely satisfactory to the drivers and their lap times, as at Zandvoort, were not as good as the cars looked or sounded.

The Italian contingent included two Cooper-Maseratis and two Cooper-Ferraris, the latter pair being 1959 Cooper chassis fitted with Ferrari Super-Squalo 240-bhp

engines. Among the current Formula 1 leaders these Italian efforts are far from threatening and only add color and diversity to the starting grid, despite serious efforts by the drivers, Masten Gregory in particular. Maserati continues to develop its experimental head for the 2.5-liter four-cylinder engine, but it wasn't fitted to either of the Centro-Sud cars at Silverstone.

Most sensational aspect of this year's British Grand Prix was the fact that 16 out of 25 cars finished, an unheard-of figure at continental races. Both Ferraris finished, two laps behind the leader, with Trips and Hill involved in a private struggle the entire race. Another American enjoying himself at Silverstone was Chuck Daigh, driving a 1959-type factory Cooper-Climax. His fastest race lap was 1'37.8", 11th fastest, comparing with Graham Hill's f.t.d. of 1'34.4". Chuck's engine blew on his 58th lap while lying 12th.

The inconsistency of the B.R.M. end result is extremely difficult to understand. Presumably Graham Hill would have won the race had he not been distracted. Bonnier's car suffered from a variety of ills which culminated in the failure of the rear suspension. Dan Gurney's gear shift lever was broken on the starting line, forcing him to shift with both hands. And the B.R.M. engines continue to run hot on most occasions and still suffer from valve spring trouble. All in all the car is a far-from-reliable automobile, yet capable of astounding everyone occasionally. Graham Hill's superb demonstration of skill requires only further experience to balance it.—JLA



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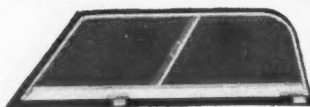
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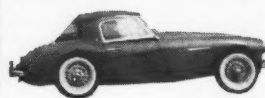


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## LETTER FROM TEGUCIGALPA

Continued  
from page 60

leaving the country. We arrived there at 10:15 a.m. Saturday, exactly 48 hours and 15 minutes after leaving New York. The car performed beautifully, requiring only one quart of oil, and that due to the newness of the engine. It was serviced in a couple of hours and we took off for Laredo to cross into Mexico.

We arrived at the Mexican Immigration offices about 4:30 p.m. on Saturday. The man looked into the car at those three cartons of parts and told us we'd have to wait until Monday for the customs inspectors to clear us through the border. We argued that we had to get through *right now*. The man said that perhaps for a few Yankee dollars he could arrange it. We gave him a few Yankee dollars. He arranged it. He arranged it as far as the next office, where we were told we'd have to wait until the customs inspectors returned on Monday. No payola this time, so we turned around and recrossed the bridge to Texas.

We cooled our heels in Laredo for the rest of the weekend. On Monday we ventured forth again, entertaining thoughts of dumping the spare parts in the motel parking lot. By the end of the day we wished we had. It's a funny thing; with tourists passing through all the time you'd think the customs people would be able to speak at least some English. But they don't. Hal knows some Spanish, but not really enough to explain the existence of the cartons, why we had them, and what each item was. Luckily, we were "adopted" by a young insurance salesman, who seemed to know everybody in the place, spoke perfect English, and got us through the mess in about four hours. Without him we'd probably still be there.

We happily left the border behind and headed south. Next stop, Mexico City. The Pan American Highway from the border to Mexico City is a two-lane hard-surfaced road similar in most ways to the secondary roads in the United States. The only obvious thing lacking is the continuous stream of motels, restaurants and gas stations.

As we drove through the night I became aware of another thing that was lacking. There was no distinguishable white line in the center of the road. Funny, the things you take for granted until they're missing. There were patches of fog most of the way and it was extremely difficult to follow the road without the aid of a line. Another thought that crossed my mind during the night was the wish that we had equipped the car with a pencil-beam driving light and a good fog light. Anyone planning to drive through Mexico should have them installed. The road is good enough to permit sustained speeds of 75 to 80 mph, but the biggest danger lies in the cattle that wander on the roads. Normal headlights are just not good enough to pick out a dark brown or black animal at night.

We drove on through the next day violat-

ing all the rules set down so carefully by the people who write tourist guide books. When we got hungry, we stopped to eat. It didn't matter what kind of a road side stand it was, nor how many flies were buzzing around the food. . . we were hungry and we ate. And we didn't even get a hint of "Montezuma's Revenge." Just lucky, I guess.

At about cocktail time Tuesday we arrived in Mexico City, and decided to take a much-needed rest. After all, we had driven non-stop from New York to Laredo, and then non-stop from Laredo to Mexico City. . . so nothing was too good for us. The "nothing" we decided on was the Continental Hilton. There we met Jean-Pierre Piquet, the hotel's executive assistant manager and proud owner of a white Alfa. We asked him about sports car activities in Mexico, and particularly about rumors of a revival of the Pan American Road Race. He said President Lopez Mateo had recently bought a Maserati and was definitely enthusiastic about holding the race again. After having driven a portion of the road that was used for the race, I wondered if it was really such a good idea. It sure as hell isn't Lime Rock!

Having set out originally to evaluate the practicality of touring through Latin America in a small sedan or sports car, I was somewhat disappointed by the lack of excitement so far. The roads are normal, and driving conditions, except for the aforementioned white line and animals, are about the same as those in the States. Gas is a bit of a problem as it is rather low-test, and the change in altitude from Texas to Mexico City might require a carburetor mixture adjustment. We pressed on regardless, and though the engine wasn't always performing at its best, it never faltered.

Out of Mexico City we headed southeast toward Guatemala. Descending from the plateau was much the same as the climb—twisty, twisty. After a while I got the idea that I would never be able to drive in a straight line again. Yet all the while the fully-loaded Peugeot stuck like a leech. Down in the flat country again the trip became dull. There were still the ever-present animals, but other than that it was routine.

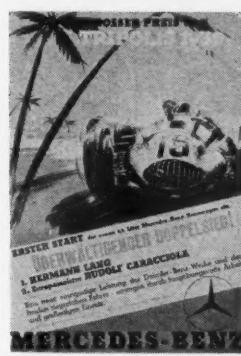
After all the trouble we had entering Mexico with our cargo of parts, we foresaw even greater difficulties in the Central American countries. After all, tourists go to Mexico all the time, but not too many drive through Central America. We were grateful for one thing, however: we didn't have to use any of the spare parts. At the Texas border the cartons had been banded and sealed and were to remain that way until we crossed the southern border. This was the only way we could carry them through without paying import duty.

As we neared Guatemala it was easy to see how the border had been established. From the flat plains of southern Mexico the craggy peaks of Guatemala rose, forming a natural division.

The man-made division is a little less exotic, consisting of a rope stretched across the road and a farmhouse with the word "Migracion" painted on one wall. With Mexico a few yards behind us we carried all our papers into the shack, fully expecting a wild, hand-waving argument about

(Continued on page 80)

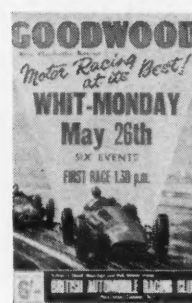
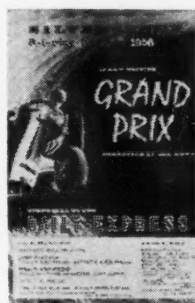
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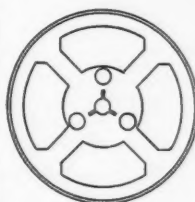
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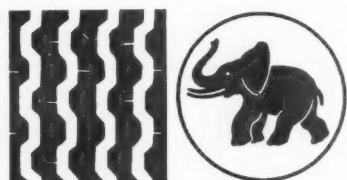
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(Continued from page 79)

crossing the border with our car full of contraband. Instead our passports were inspected and stamped, our baggage was prodded, and we were sent on our way with a warning about road conditions and the distance to the nearest gas station.

What were the road conditions? Well, we were told to take a certain route and to bypass another route which would take us into almost impassable mountain country. All this information was marked on our map by a friendly border guard who also mooched a few of my American cigarettes. When we were briefed, the rope was lowered and we passed from the paved road of Mexico to the dirt road of Guatemala. We estimated that we had enough gas to get to Huehuetenango which, we were told, was about 60 miles away, where we were also to look for the detour around that bad mountain country.

The transition from pavement to dirt is not easy to make. The stones kicked up from the wheels make an awful clatter on the underside of the car and I was tempted to drive slowly for fear it would be battered to bits. After an hour or so the noise is no longer disturbing, and speed increases accordingly. Speed is not the most desirable commodity on those roads, however, as detours pop up frequently and unexpectedly. The country is so mountainous that landslides often wipe out large portions of the road.

After many detours the odometer indicated that we were near our alternate route, and the fuel gauge indicated empty. And where was Huehuetenango? According to the map it was right on the highway, but when we finally saw a sign, it indicated a left turn on a secondary road for about nine miles. We headed for the lights of the town, located a gas station, and filled the tank with not much to spare. Then we felt our way through the maze of twisty streets back to the highway. Meanwhile, back at the town, unbeknownst to the intrepid travelers, we had not gone out the same way we went in. So we did not get on the highway at the same place we got off. So we missed the alternate route, and so we took the one we were warned not to take. The result was a four-hour climb from just about sea level to around 13,000 feet . . . all of it in first gear on a road "paved" with loose rocks the size of grapefruit. At last the trip was getting interesting! As to the advisability of trying the same thing in a sports car, forget it. The ground clearance on the wagon was barely enough to clear the rocks.

At about 1:00 a.m. we saw the lights of the city of Quezaltenango, found the most desirable hotel, and hit the sack. Next morning we headed toward Guatemala City, on roads that had at least leveled out to the point where second gear was not always necessary. One of nice things about Central America is the availability of American gasoline. Esso, Shell, Chevron, and Texaco products are readily available and the gas stations resemble the ones in smaller U.S. towns except for the use of Spanish.

The rest of the trip through Guatemala was a succession of detours which finally brought us to the border of El Salvador. Smooth silence! The road in El Salvador

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is paved! Just as the mountains and plains form a natural boundary between Mexico and Guatemala, so it is at El Salvador. The country is almost flat, and the Pan American Highway is paved across the entire width of the country. Of course the country is only 150 miles wide, but it's paved.

After a night's rest in San Salvador we were optimistic about the rest of the trip. Heading for the Honduras border, we thought the worst of it was over. The car performed perfectly, and the ease with which we crossed the borders was very encouraging. We were sure we would be driving into Tegucigalpa that night.

The border is approximately 70 miles from the capital city of Tegucigalpa, and when we arrived at customs we felt if need be we could push the car over the last leg of its journey. As it turned out we didn't push it, but we didn't drive it either. We just left it at the border.

One of the purposes of the trip was to deliver the car to its owner in Honduras. For that reason we couldn't claim, as we had at all the other borders, that we were *transito*, passing through the country. To the officials at the border we were actually importing the car, and therefore had to pay duty. The figure they arrived at was approximately \$1300. Since I never carry more than \$50 in cash, we had no alternative but to abandon the car and telephone the owner. As luck would have it, the phone lines were down. There were no more buses running that day. There were no trucks going that far. Seventy miles is a long walk.

Our salvation arrived in the form of a limousine, a Ford station wagon that had a couple of empty seats. The fare was \$1.50 each. We piled our baggage on the roof rack and climbed in. Before we left, the radiator was topped up, the brake fluid reservoir was topped up, and the bare wires protruding from the steering column were touched together to check the horn. We hadn't gone a mile when I noticed that the brake pedal went to the floor when used, and the car barely slowed down. Oh well, maybe the driver wouldn't have to use them too much. And then on the first downhill section my worries were relieved; the man actually downshifted. What's more, he turned off the engine for better deceleration. It wasn't until the next downhill that I really began to worry. . . he wasn't downshifting, he was putting it in neutral! And the engine was turned off to save gas! And all the while he kept pinching those two little wires together to warn others of his impending suicide.

As if this wasn't bad enough, the radiator boiled over every couple of miles. And then the left rear tire blew. When it was removed I noticed that the entire inside sidewall was rubbed away and the tube was protruding for about 120 degrees of the surface. The spare wasn't much better, except that now the tube was showing on the surface where the tread used to be. It blew out a few miles later.

At this point another "bus" came along, we transferred to it, and made it the rest of the way.

So here I am at the Hotel Lincoln. We plan to fly back to New York.

Regards,  
Don

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Come In

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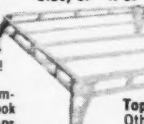
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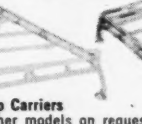
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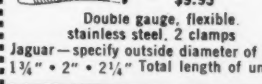
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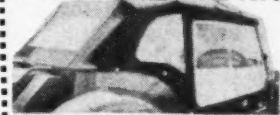


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82/SPORTS CARS ILLUSTRATED/NOVEMBER 1960

## BORGESON ON RECORD BREAKING

Continued from page 31

Committee. The member present at the December, 1959, meeting in Paris refused to mention it. As we say at Bonneville, there's always next year.

Drag racing, as tremendous as this sport is, has just begun to grow internationally. It is held back overseas by the scarcity of big Detroit engines, for one thing. N.H.R.A. has created displacement classes following the F.I.A. categories in an attempt to stimulate competition in the rich, small-displacement field. This has failed to attract participants because why should you turn 78 in the quarter (perhaps fabulous for your engine size) when you can turn 178 with a big iron on your hip? But if we had the incentive of international class records for acceleration at the drags there would be a new incentive, here and overseas. Headline: "Fiat Rail Blasts 1100 cc F.I.A. Record in New Zealand!" This, too, could happen. The basic idea of drag racing—stock components, strips that can be built anywhere—should work everywhere. But the small-inch record men have been deprived of the glory.

Somebody's missing a huge fortune by not taking a few dragsters on world tour. They wouldn't have to be the very hottest machines. Just, say, a couple of going fuel rails and a couple of gassers. These could put on a show the like of which has never been dreamed of in England, France, Germany, Italy, Sweden, Central and South America, Australia, Japan and the various Slobbovias. Russia would be good: this is the kind of story, the State Department tells me, that we want to tell those people.

If I were doing it I'd run a test in Mexico City. Make a deal with the best race promoter there and show up with cars and with press kits for the local papers and film clips for TV. Kick off the entertainment with acceleration trials for the hottest local iron around. Then a contest between the gassers, then the spectacle of the fuel burners. What a revelation for those people! They would come in Mexico and they'd come anywhere. Let the participants share in the profits.

An interesting recent move of the F.I.A. was its recognition of kart competition and of regulations "pour Vehicules K," which are very close to those laid down originally by the Go Kart Club of America. It is by the sheerest coincidence that kart is spelled with a "K," that the F.I.A. terms karts "Vehicules K" and that there is an International Class K which happens to be pretty right for kart-engine displacement.

But, lest order emerge out of confusion, a top F.I.A. spokesman writes, "The fact that we have called these small machines 'K' vehicles does not imply that they have anything to do with actual motor cars belonging to Class K of the International Sporting Car Code which is one of the eleven classes of motor cars carrying out attempts at International records. This Class K includes all motor cars with an engine cylinder capacity up to 250 cc (15.25 cubic inches)."

Whereas the Ostich machine admittedly does not fit the definition of an automobile (for which "motor car" is a synonym) given in Article 13 of the Code, it's hard to see on what basis karts are denied the right to make attempts on International records.

One of the most common criticisms made against the F.I.A. is that, while it makes the rules that govern automobile competition internationally, it is made up of elderly, wealthy gentlemen who have absolutely no first-hand knowledge of racing. This is largely true, but not entirely so. However, no one who has turned one fast lap in a good Super A or hotter kart would question for an instant that such machines are "actual motor cars" or, for that matter, that they are legitimate racing cars worthy of fear and respect.

Immediately upon receiving the F.I.A. opinion that K Vehicles do not "have anything to do with actual motor cars" I sent data and photos of the small Schapel streamliner (SCI, June, 1960) to Paris to ascertain its status. The reply stated, "As you know, motor cars of this class only have to comply with the general definition of an automobile such as it is given in Article 13 of the Code and be propelled by a piston engine with a displacement of not more than 250 cc. The machine which is shown appended to your letter is therefore quite in order." Does this confuse you? It does me.

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I also suggested that it might be desirable to consider adoption of the displacement categories under 250 cc which are recognized by the *Federation International Motorcycliste*, starting at 50 cc. This finer breakdown of engine sizes probably would excite little interest in track competition but would greatly enrich straightaway record competition in sub-K classes. The reply to this was, "I am not too sure whether the idea would appeal to the C.S.I. Indeed, I am not aware that there is a great number of high-performance machines of the above categories outside of the United States."

Well, karting has been sweeping Europe for some time. There are already over 40 kart manufacturers in England (Stirling Moss is in the business) and the sport is spreading across the Continent. Over there, high-performance engines abound: Aer-macchi, Anzani, Benelli, BSA, Excelsior, HMW, Konig, Lambretta, Maico, Maserati, Puch, Rotax, Rumi, Villiers, and Zundapp are a few. The sub-K F.I.M. classes are 50, 100, 125, 175, and 200 cc; applied to four wheels they could be tremendously challenging.

—GB

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**SPEEDWELL GT  
SPRITE**

Continued  
from page 57

envious list of racing successes it has to its credit—with class lap records to prove that it's not just winning on reliability. Disc brakes are available, and have been fitted on several customers' cars, and conversions to 8-inch front drums are also offered. Yet the brakes of VP 7 seem completely adequate.

Suspension is a subject which has received attention from Speedwell ever since the company was formed, and on the GT Sprite the chief modification is the fitting of a front anti-roll bar, coupled to the lower wishbones, which endows the car with mild understeer. Speedwell also fits harder valving in the shock absorbers, thus cutting down the fore-and-aft pitching which is characteristic of all BMC cars on certain types of road surface. The excellent and standard rack-and-pinion steering gives a feeling of great controllability in corners, and on the straight there's little tendency to wander despite the short wheelbase.

The Speedwell Sprite, then, is well equipped to deal with the extra power of its much-modified engine. As tested, VP 7 was fitted with a unit tuned to what might be termed Formula Junior specification (Speedwell calls it "Clubman 70") with virtually open exhausts and a 1500 rpm idle. Yet for all this it proved to be incredibly smooth—the product of thorough bottom-end balancing—and completely free of temperament as long as treated reasonably in heavy traffic. This involved keeping the revs above 2000 and running normally at 3000 and upwards, but little difficulty was experienced in doing this, thanks partly to the beautifully quick, light gear shift.

The engine really comes into its own at about 4000 rpm, as the special cam begins to make its presence felt, and runs up without hesitation to the normal limit of 7000 rpm in all the gears. Here it should be explained that in the high-speed runs carried out in Belgium the engine was taken up to 7400 rpm in top gear, since there hadn't been time to change the axle ratio. That it withstood such treatment, and was then driven back to England and raced successfully at Goodwood, says a lot for the way it was put together.

Externally, the chief evidence of Speedwell treatment is a pair of Amal carburetors on special manifolds. Inside, the ports and combustion chambers have been re-shaped, special valves (oversize intakes) and springs have been fitted and compression has been increased by the use of flat-top pistons. The valve gear has been extensively modified to make the best use of the firm's CS5 camshaft, and crankshaft, connecting rods and pistons have been carefully balanced. As might be expected, all this costs money. It involves no major departures from standard—as would bar the car from international racing events—but results in an improvement of more than 70 percent in power output. All this, in conjunction with stable handling and braking, makes the Speedwell GT Sprite a very attractive proposition.

—David Phipps

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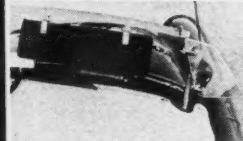
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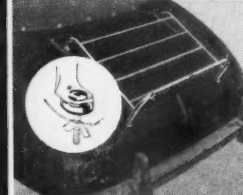


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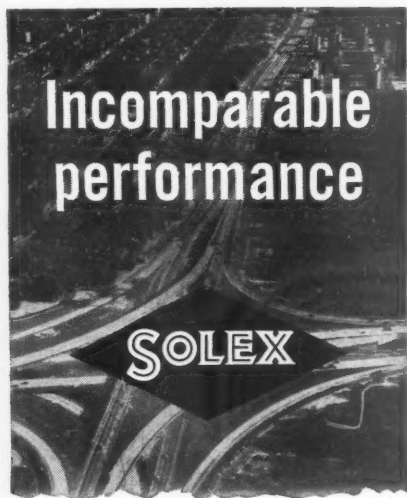
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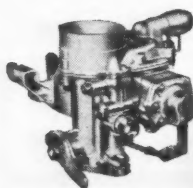
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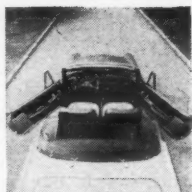


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## ROAD RESEARCH REPORT: RENAULT CARAVELLE

*Continued  
from page 64*

dead-ahead position, there is slight play. Road shocks are all but eliminated by the time they reach the steering wheel rim, even on rough surfaces. The rack and pinion gear offers precise control for threading through traffic and the 30-foot turning circle makes parking quick and sure.

A quick start was the result every time we turned the ignition key and the automatic choke kept the engine idling briskly until the temperature needle started to climb. There was no noticeable slack in the throttle linkage and, under no load, the engine revved freely. Yet in our standing-start acceleration runs, the car had the feeling of being in the last stages of some fatal respiratory tract ailment as it gasped before moving off the mark. In normal use, however, it was fully tractable and brisk enough to keep you from being plowed under when the light turned green. Up through the gears, driving was free and easy with wind and engine noise surprisingly slight. With the top down, there was very little turbulence and when it was erected the only noise emanated from the crevice caused by the mating of the top and the windshield's upper rim. The rear window was a source of annoyance. It flapped audibly, and enough so that it was next to impossible to distinguish shapes behind the car. Ripples from having folded the top didn't help any as they refracted images in the rear-view mirror. As we said, the only side windows are those in the doors and there were Mack-truck-sized blind spots to rear.

### SHIFTING PROBLEMS

The clutch and brakes showed no peculiarities, but the gear shift retains all the unpleasant traits of the Dauphine's wand. There is a long throw to first and third in the four-speed box, and vagueness of feel and a general sloppiness is the sensation once a gear has been found and engaged. Now that Renault has come up with a popular model like the Dauphine and has seen fit to offer the Caravelle, which adds extra steam to extra styling, we think their engineers might give some time to per-

fecting the shift linkage. If it's impractical to move the lever back about three inches, they could possibly introduce a bent lever which would bring the selector within an easy arm's reach. For the driver who keeps the seat as far forward as possible, the shift position is fine, but anyone in the five-feet-plus range will wish he had uncommonly long arms.

The extra horses in the Caravelle's cavernous stable are attributed to modifications devised originally by Gordini. With a bore and stroke identical to the stock Dauphine, the extra go has been achieved through bigger, smoother ports, a different cam, a higher compression ratio and larger-throat carburetor. A cold air box, mounted above the spare tire in the bow of the car, has a pipe running from it the length of the underpan to the engine compartment where it feeds through a two-stage air filter into the Solex 32 P.I.B.T. carb (the standard Dauphine engine uses a Solex 28 I.B.T.). Despite the compression boost, the Caravelle performed well on regular grade gasoline. But, as they say in the owner's handbook, "the use of premium fuels, although not necessary, is not detrimental to the engine." While we did not check performance with a "better grade" gas, there was nothing to indicate that the car's octane appetite was not being satisfied with regular.

### MINIMAL MAINTENANCE

Our Caravelle—and we almost came to look on it as our own, since we drove it some 1500 miles during this Road Research Report—used neither oil nor water during the test period. We picked up the car from Renault, Inc. when it had but 57 miles on its odometer and broke it in according to the book. A throttle-limiting device kept top speed down to about 55 mph for the first 600 miles and made thruway driving, especially passing or pulling out into traffic, pretty chancy. The car showed no oil or water leaks and never overheated, even during our acceleration and top-speed runs. A nice feature of the tool roll, which contains four open-end wrenches, a screw driver and a plug wrench, is the jack handle which doubles as a crank for the engine—helpful if the battery goes dead or when timing the engine. The owner's manual is very complete. It includes in its maintenance and adjustment section a trouble-shooting guide for use if you should get stranded far from one of the numerous Renault dealers. For the novice do-it-yourselfer, there are data and illustrations telling



how to perform routine tune-ups. Accessibility to the engine is superlative and the engine compartment has a built-in trouble light.

As we mentioned, the Caravelle we tested was fitted with the optional (\$80.40) four-speed transmission. (The only other extra it had was white-wall tires, \$20.) In both the three- and four-speed boxes, first and top gears are identical; it's in second and third of the four-cog unit that differences exist. First, in both, is 3.70 to one. In the three-speed box, the ratios that follow are: second, 1.80 to one and third, 1.03 to one. The four-speed transaxle uses these: second, 2.10 and third, 1.45 to one and fourth, the 1.03 to one ratio. Both use a 4.37 to one rear axle ratio and no options are offered. In the four-speed transmission, the top three synchromesh gears were virtually silent and reverse was easy to engage.

#### LOOKS BETTER AND IS BETTER

SCI's staff testers were genuinely pleased with the Caravelle. While it could not be considered an inexpensive car, there were reasons, apart from the richly-styled body, that would seem to justify its price margin over that of the Dauphine. The three Caravelle models, differing only in what goes over your head, are priced this way: convertible, \$2395; coupe, \$2445 and the convertible with detachable hard top, \$2525. All are East Coast POE prices with the three-speed transmission.

What do you get for the money? The Caravelle, with its trim, crisp styling, is a limited-production car. It might be expected to have somewhat inferior quality control than the line's mainstay. Yet the Caravelle not only looks better, it looks better built. All the panels are free from ripples; we saw no traces of thin or orange-peeled paint. The doors hung properly and worked without fuss. There were detail niceties like the device to tighten the canvas top when it's erected to prevent drumming. But mainly for the extra dollars you spend for the Caravelle over the Dauphine, you are buying an *air sportif* that's missing in the four-door sedan. This is not to say we had no complaints about Renault's dreamboat. We did, but these are mainly trifling. There should be more space between the pedals; there should be a larger rear window in the soft top and there should be interior door locks. Some of us felt the windshield dog leg was annoying to bang when exiting; others felt a side-view mirror should be standard equipment. The horn/headlight switch left mixed reactions and the lack of adequate over-riders on the bumpers caused some alarm among city drivers. The location of the filler cap in the engine compartment came under fire too, for sometimes fumes entered the cockpit through the heater mounted near the filler.

But the Caravelle leaves the impression of being a pleasant car to drive and own. Despite Renault's claim, we would not classify it as a sports car. Yet it offers a sporty feel, chic styling, good economy, quiet operation and room for four. It could be a smart buy for people who like sports cars but wouldn't want to own one. With it Renault has squarely met the sales challenge of VW's Karmann Ghia. While it's unlikely that you'll ever see a Caravelle taking a first in a race, it's certainly a winner in the curbside concours. —SCI



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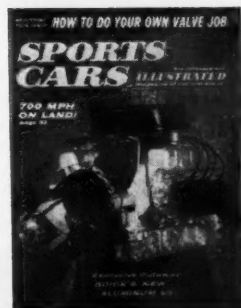
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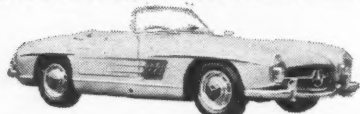
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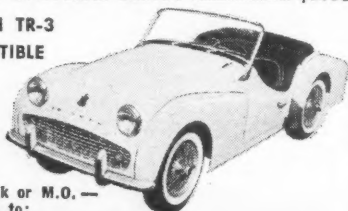


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### HILL NEVER HAD IT EASY

Continued  
from page 36

absences without leave from S. Smith and Sons ensued. He didn't actually drive the Cooper on these subsequent visits to the track because he couldn't afford it. He just worked on the car, readying it for other hams who did have the price of a ride. He wasn't paid for these services; on the other hand, the Cooper's owner charged him nothing for the privilege of setting tappets, taking up chain slack, bending bent things straight, and the like.

Anon, this curious enterprise folded, its place being taken by a veritable school of race driving with a doubled complement, viz., a Cooper and a Kieft, 500s both. As this proves, the new promoter had bigger ideas than his predecessor, and he proved it further by accepting unhesitatingly when Hill offered to work for him full-time without pay, instead of just half a day per week as before.

So Graham quit his Smith job for keeps, registered himself as officially unemployed at the Ministry of Labor (thus establishing entitlement to live, albeit frugally, at the taxpayers' expense) and thereafter made the Hampstead-Brands-Hampstead round trip each day by bus. His M.O.L. dole just covered his bus fares, and for the rest he continued to reside with and at the expense of his parents. Having perforce stopped contributing to the family exchequer, he let his mother into the secret of his occupational suicide, and she entered into a pact to conceal it from his father.

In order to get full value for the wages he wasn't paying, the school principal next proposed Hill should add a weekly instruction session to his other duties. But professorial status, it was felt, demanded that he first contest, anyway, one motor race in his own right. He was therefore entered, on the school Cooper and at the school's expense, in a 500 cc event at Brands Hatch early in 1954. Due entirely, he says, to his own ignorance of how much punishment an engine and clutch will theoretically stand, he made a terrific but inhumane getaway in his heat, repeated the performance in the final, and placed second and fourth respectively. With this experience behind him, backed up by the free use of a lot of esoteric terms he'd gleaned from the shoptalk magazines (understeer, oversteer, polar moments, stuff like that), he felt qualified to, and did, embark on the teaching role with every semblance of authority.

The school, however, didn't stay the course, and with its demise Graham found himself out of ungainful employment, again looking for opportunities to con his way into something with a connection, however remote, with racing. Nature having endowed him with a candid countenance and an engaging manner, the chance wasn't too long in coming. At a Brands Hatch meeting late in '54, he unobtrusively infiltrated Colin Chapman's household cavalry in the paddock. With nobody quite knowing who'd invited him, but everybody presuming somebody else had, he rode back to

London that evening in Colin Chapman's car. Upshot of the hitch was that Graham was bidden to drop in on the Lotus place at Hornsey any time he was at a loose end and do some work on the racing cars. He did, and received payment for his intermittent services — bounty beyond dreams of avarice! — at the rate of one pound per day. About \$3.00, that is.

With the I-too-could-be-a-speed-king thought never absent from his mind, Hill freelanced industriously but seldom lucratively around this period, interspersing his on-off Lotus labors with a likewise intermittent job of mothering a Lotus-Climax for a private owner named Dick Steed. Anon he formed an impermanent association with another lesser light of the British racing scene, fellow called Dan Margulies; he was operating a C-Jaguar and in 1955 took Hill along with him on a tour of foreign races embracing sundry continental and North African theaters. Graham co-drove the Jaguar with Margulies in the ten-hours race at Messina, Sicily, and afterwards crossed the Tyrrhenian Sea and rode as traveling mechanic with Dan in a rather unusual marathon the Sardinians run from one end of their islands to the other, there and back over the same itinerary. "For those in danger on the C", and also of course for the rest of the field, he remembers thinking how unfortunate it would be if the organizers had failed to make sure all the runners completed the south/north leg before releasing the leaders on the reverse route. They did make sure, though, and Margulies/Hill placed third overall. Evidently pleased with Graham, Dan gave him a few rides *à seul* back in England after their return.

The year 1955 was important for Hill. For his part he asked the hand of Bette Shubrook, a famous English oarswoman, in marriage, and Lotus Engineering asked the hand of Hill in full-time employment. The answers were the same in each case: "I will." He married Bette (they now have a toddling daughter) and went to work at Hornsey all week 'round as a mechanic, meanwhile building castles in the air on the foundation of an unwritten understanding he had with Colin Chapman that he, Graham, might, if a chance occurred, get an occasional ride under Team Lotus auspices.

It indeed occurred, and soon, with a result we mentioned *en passant* earlier in this story. Accredited Lotus factory drivers for 1956 were Cliff Allison and Reg Bicknell, but Allison, for some reason I've forgotten, missed out on one of the season's early Brands Hatch meetings. Hill was offered the spot and duly drove in two races, one with an 1100 cc limit, the other 1500 cc. His car was the same both times—an eleven-hundred. To the astonishment of all beholders, he won the 1100 canter outright, placed second to Bicknell (who had the benefit of an extra 400 cc) in the 1500 feature, and in doing so clipped Colin Chapman's class lap record in spite of the same large capacity deficit.

Things were looking up, and racing folk were looking at Hill with the whetted interest and respect that always greets a thrustful interloper who bursts somewhat suddenly into the limelight. His style, they noted, was aggressive yet tidy and well controlled. In spite of his considerable bulk

(he's six feet tall and weighs 185 pounds), he somehow managed to avoid any impression that he was stuffing himself into the low-loading Lotus by main force. The observant remarked that when he was driving his face maintained a curious impassivity of expression, like well-set blancmange (except that blancmanges don't have mustaches), and in contrast to the physiological contortions indulged in by poor Mike Hawthorn, among others. To this day, as many photos testify, Hill practically never lets his face slip when driving; he says it involuntarily becomes so rigid during races it takes a conscious effort to limber it into mobility afterwards. Another recognition feature of the lanky Londoner is his helmet decor—a design of arrow-headed white blobs on a dark blue background, embodying the colors and insignia of the London Rowing Club.

Disappointingly, but no doubt for good reasons of his own, Chapman didn't offer Hill any more rides, so he left Lotus and drove for various other sponsors and constructors, including John Cooper (once only, teamed with Brabham and Salvadori), John Willment, John Tojoro, Tommy Atkins and some more whose names wouldn't mean much to American readers.

Meanwhile, as his standing in the competition world improved, his standards of personal transportation declined from the merely unpretentious to the positively crummy: from Colin Chapman's wife Hazel, for a sum equivalent to \$70.00, he bought a Chummy Austin Seven, minted the year he was born, 1929. He kept it for two years, never spent a penny on it, seldom bothered to replace the parts it shed in its wake, and in the absence of brakes that worked, slowed or stopped it by scrubbing its tire walls against curbs. In 1957, to anticipate events slightly, Hill became a director of a well known London speedshop, Speedwell Performance Conversions Ltd., and the following year he parted with the crummy Chummy and espoused a Speedwell-converted Austin A35. This he often raced with considerable effect in events for small sedans. The main requirements for racing success, in Graham's opinion, are anticipation, concentration and determination, and he's found nothing develops these attributes faster than driving a practically brakeless 1929 Austin Seven.

Having resigned his job at Lotus because the hoped-for driving assignments weren't forthcoming, he was slightly surprised when, later the same year (1957), Colin Chapman invited him to rejoin the firm in a full-time driving capacity. This offer, which Hill jumped at, may have been prompted by the win he'd notched earlier in the season in the 1100 cc division of the BRDC's long-lived British Empire Trophy classic at Oulton Park, Cheshire, with a class lap record for good measure. His car that time was a Lotus Eleven owned by one Doc Manton.

Hill's showing on Lotus in the *Grandes Epreuves* during 1958 and '59 can be summarized by saying he made the best of equipment that consistently failed to do justice to the true genius of Colin Chapman and his collaborators. Every make goes through woebegone phases, and this was such a phase for Team Lotus. The cars

(Continued on page 88)



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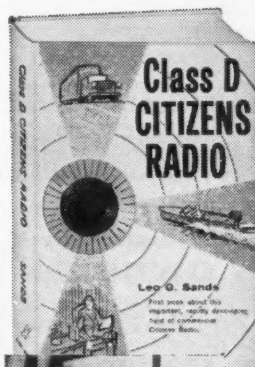
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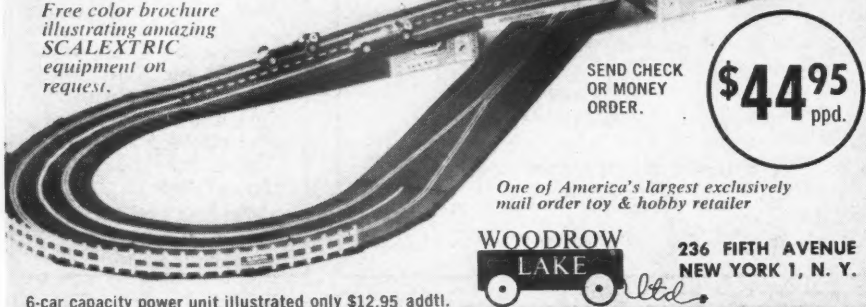
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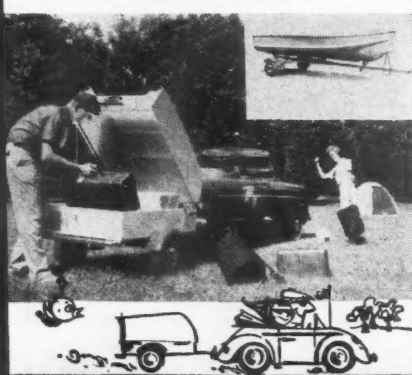
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(Continued from page 87)

Hill drove during these two seasons were, with occasional exceptions in relatively minor events, anything up to 10 mph slower than the contemporary Coopers with equivalent Climax engines. Additionally, of course, Lotus was suffering from every kind of mechanical frailty in the book.

Oddly enough, the one and only time Graham really looked like finishing high up in a *Grande Epreuve* pre-1960 was in the very first Championship race he contested for Lotus—Monaco, 1958. In the Monaco tradition, the field was to be limited to sixteen starters and, with only 2 liters of Climax to play with, he wasn't displeased when he found his best practice lap placed him fifteenth. So he was in, anyway. In the race, as so often happens at Monaco, the fast boys started dropping out all over the place, and Hill's credulity was progressively strained as his pit signals showed him to be creeping up to placements he'd have bet a year's income he could never make. When they hung out the board with "4th" against his number, he knew it was too good to last and it was. Something blew and he was out.

It's a curious fact, and Hill's case illustrates it, that it's possible to attain the exclusive rank of factory driver in the Grand Prix without ever having driven really fast in your life. Before he went to Spa for the 1958 Belgian G.P., for instance, his experience stopped short not far above two miles per minute. The gap in his education became painfully apparent when, hitting over 160 on the fastest Spa leg during practice, he found himself seized with something approaching panic and thought "Oh dear, I'm not meant to be a racing driver". His throttle foot evidently thought the same way, because he remembered it kept lifting itself off the pedal. With further practice, though, he managed to persuade both himself and his right foot he was meant to be a racing driver, and behaved accordingly. In the Prix itself his engine blew up with great finality at around 160, just as Mike Hawthorn was about to come by. Having cultivated the habit of always keeping his left foot poised on the clutch, rather than on the rest, he was able to disengage the locked-up engine from the back wheels fast enough to ensure that Mike indeed came past instead of through him.

Perhaps even more than most drivers of world class, Hill pays meticulous attention to anything and everything pertaining to comfort and nicety of control on any car he races. In matters such as seat height and interrelative positions of feet, hands and posterior, he just doesn't recognize plus/minus tolerances—either the damn thing is right or it isn't, and if it isn't he'll go on fussing and fiddling until it is. The people who finance, build or prepare racing cars have a big responsibility to the driver, and the driver in turn, he points out, has an equal responsibility to the sponsors, constructors and mechanics. If he can't take the trouble to ensure he's in as full control of the car as possible, he's falling down on this responsibility.

Graham had his first taste of racing on the American continents early this season, first in the Argentine G.P. with B.R.M., where he and team-mate Bonnier both retired with broken valve springs after making



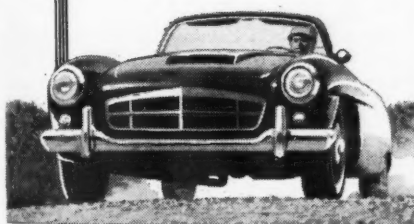
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the front row of the grid; then on an RSK Porsche in the Buenos Aires 1000-Kilometers, where he co-drove with Bonnier, placed third overall and won the up-to-1600 cc class. "My best success so far", he says. But Sebring in March came close to yielding a better success again: the Hill/Bonnier Porsche was up in the lead on Index and third overall when, somewhere around halftime, it lapsed into un-German activity and threw a rod.

It seems there was an Englishman, an American and a Swede... and the moral leadership of B.R.M.'s 1960 team was wide open to whichever one of them could claim it by right of conquest, or failing outright conquest, highest placement and fastest form in the races that mattered most. We didn't have long to wait for the answer to this one. Hill was the name.

A crash through nobody's fault but his own in the Monaco G.P., opening the European leg of the World Championship, wasn't the best of auguries. But the Hill-Gurney-Bonnier seesaw took a significant tip in Graham's favor when he placed third at Zandvoort (Netherlands G.P.) a week later, behind Brabham and Innes Ireland. At fatal Spa in the Belgian G.P. which cost the lives of Chris Bristow and Alan Stacey, Hill's mastery of the rear-engine B.R.M. was dramatically confirmed. After tying with Brabham (Cooper) and Ireland (Lotus) for a 136.02 mph lap record (shades of the diffident Hill who'd wondered, only two years earlier, was motor racing too fast a sport for him...) he was up in second place with just one lap to go when his engine blew. He still could have been third if he'd remembered to stop short of the line and coast over it later in the wake of Brabham, who won, and McLaren, who was finally second, but his expensive piece of absent-mindedness reduced him to DNF rank.

In a starting-line ramming match at Rheims, precipitated by the notoriously flag-happy starter Roche and involving Hill, Trintignant, Bianchi and Halford, Graham came off worst and ended his race in a matter of meters with a much bent B.R.M. But at Silverstone's British Grand Prix he was to give the promoters a lot more motoring for their starting money—motoring that had 80,000 Englishmen rubbing their eyes and prompted THE AUTOCAR, unprecedentedly, to devote its headline to a driver who failed to finish ("Hard Luck, Graham Hill!"—with Brabham's victory relegated to a subtitle and smaller type). At the start, a stalled engine and a resulting shunt up the stern from Tony Brooks (Cooper) left Graham momentarily standing, with 23 cars rapidly dwindling into the distance. Then the B.R.M. petered in and he went to work. In history's ten British Grands Prix, there'd never been another drive like it. Hauling up place after place, Hill took Brabham—and the lead—on the 55th lap, held it for seventeen more, turned fastest lap at 111.62 mph, and then, only five laps from the end, spilt it on a corner. Out.

B.R.M., like Lotus, has a trophy it awards each year for the season's best race performance behind the sign of the tricolor hot cross bun. They won't have to think twice which driver to give it to for 1960, and Graham Hill won't have to wonder why they've picked on him.

—DM

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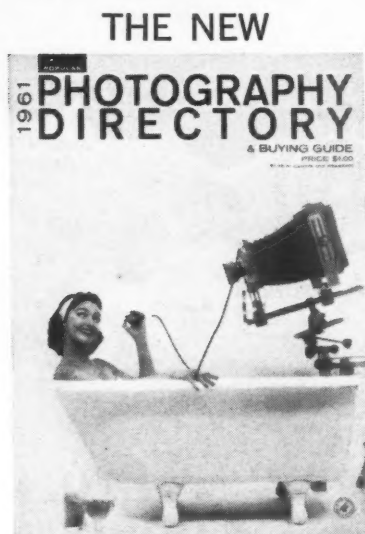


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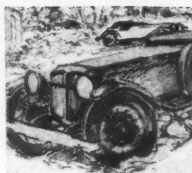
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## THE BEAST OUT OF SHTUNKE

Continued  
from page 55

pipes, right from the very rear of the car, using a complex, long-handled pair of pliers, with a built-in light and mirror, rather like some of the equipment that dentists wield so fiendishly.

In designing his cars, Shtunke was quite fanatic about two things in particular: (a) the cars had to be quiet, and (b) they had to be safe, whence came the company motto: "THERE IS NOTHING LIKE A SAFE, SILENT SHTUNKE!"

He devoted an enormous amount of time to the pursuit of silence, being so successful, finally, that he eliminated all but wind noise, and as for that, he had to be satisfied with the knowledge that anything that displaced as much air as the Shtunke did was bound to make some wind-noise.

Actually, his engines were shockingly noisy. His manner of combating the noise was quite interesting. With the help of the noted acoustician, Herr Blaufunken, he turned the entire engine compartment shell into a huge, extremely efficient muffler, with only two openings, one for the carburetor intake and the other for the exhausting of heat, on the vacuum principle. Even these orifices were designed to be silent, with staggered teeth allowing the passage of hot air, but not sound. (It is rather a pity that most politicians aren't so equipped.)

Shtunke Motoren Werke made their own tires, ergo: they were silent. This allowed Shtunke to use a spot of One-Upmanship on Rolls Royce, whose tires were known to have the audacity actually to murmur, although only in movement, of course. Being the only truly monocoque automobile, the Shtunke emitted no body noises whatsoever.

With typically heavy-handed Teutonic humour, Shtunke coupled to this silent behemoth a veritable *camion*-blaster of a horn. It used to be considered great sport to ghost to a stop behind a poor, unsuspecting policeman on point duty, depress the horn gently (gently or heavily, it still shook nearby chimney-pots!) and when the chap had stopped trembling and had retrieved his helmet, politely ask him for route directions. Ah, those were the good old days!

From the point of view of safety, Shtunke would have a blasted fit if he were to see the current crop of cars, with their acres of glass and thin, if not entirely non-existent, roof posts. Believing in the minimum of glass and the correspondingly small danger from flying shards, he designed the Shtunke with a windshield height of exactly four inches.

Combined with the very low roof, this meant that one's eyes looked almost directly along the immensely long hood, occasioning numerous thumps as one ran over the odd small animal or fowl. Small children were always a problem.

However, to come back to the windshield; what with the extreme width of the car, it was necessary to use eight three-inch-blade wipers, with a separate motor for

each, all very cannily synchronized. Chaos ensued if one of them went on the wonk.

The rear window was a mere slit—a feature familiar to Jaguar owners of not too long ago—and one couldn't see too much through it, really. Not much of a bother, though, as most drivers were hesitant about trying to pass the road-hogging Shtunke and usually gave fair warning by tooting frantically before attempting (and I use the term advisedly) to overtake.

Herr Shtunke came to an untimely and unfortunate end, finally. He was out in his personal car one sunny afternoon, probably going at full chat, when a bird must have bounced off a particularly resonant part of the car. Over a period of time metal fatigue had evidently set in rather badly, because by the time the car traversed a hundred yards it had almost completely disintegrated (one casting, you will remember?) leaving scattered on the road only a very dead bird, a few strips of leather and chunks of rubber and, tragically amusing sight, Herr Shtunke, with not a mark on him, still strapped into his form-fitting seat, the detachable steering wheel clasped to his bosom. It is thought that he probably died of mortified apoplexy.

Every last one of the owners turned out for the funeral. A somber pall hung over the gathering, over and above that occasioned by Herr Shtunke's bodily passing. It was the end of an era, an era of cars that made even the Bugatti Royale seem rather piffing in size, an era of large cars and large, lusty motoring men. No more would Herr Shtunke seat himself behind his huge desk to interview prospective purchasers, with giant cigar clouds wreathed around him, judging whether or not the type seated in front of him was endowed with sufficient money to maintain the car properly and enough driving ability and experience to appreciate the car and, incidentally, keep the brute on the narrow roads prevalent at the time. (Comments on the current width of English roads should be kept to oneself.)

The moment had arrived, when the grave had been filled in and everyone stood about, not wanting to be the first to leave. Suddenly Sir Herbert Hockingwell, who will probably be remembered for his annual attempts to sponsor a Grand Prix race through the streets of London—with Piccadilly Circus as the focal point—broke away from the group, dashed over to his parked Shtunke and proceeded to rend the quiet of the countryside with the belch of his *camion*-blaster. A stunned silence for a brief moment was followed by a mad scramble as everyone made for their cars, for a final salute to Herr Shtunke.

By the time quiet had again settled good spirits prevailed, partly provided by Shtunke's son and heir, Emil; when he pressed a button on his dash, a section of his left front fender fell away and a huge stock of sturdy liquor was revealed, each bottle in its own padded pocket (silence, y'know!) The boys fell to with a will, to the accompaniment of audible sniffs from the family, who left immediately.

When the caretaker of the cemetery turned us out at closing time the whole entourage moved the scene of operations over to Shtunke Schloss for the rest of

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the evening. At midnight an impromptu race developed, using the extensive carriageways. I couldn't get into my car, due to a momentary lack of co-ordination, so was forced to watch from the Schloss steps.

Since the carriageways were barely wide enough for two normal cars side by side there wasn't a hope in Hades for two Shtunkes to pass, except by using the grass verge, over flower beds and across the lawns. Freddy Phipps, who had been baying at the exhaust of the leader from the first lap, finally managed to pass by resorting to the device of taking to the wooden bridge over the ornamental garden and goldfish pond, tearing up great chunks of shrubbery, taking off a corner of the greenhouse and rejoining the road two or three corners later.

After about an hour of this sort of blinding around, it suddenly struck me that the race was likely to go on until everyone had hit a tree or run out of petrol. The whole bash had started without a general agreement as to how long the race would last. An awful situation, you will agree. It wouldn't have done any good to try to flag the cars off—whenever I dared it would probably have been quite calmly run down by the pack. Fortunately the solution presented itself that moment in the portly form of Prince Poona, who staggered out through the portals under the weight of a gigantic jeroobam of champagne. Snatching it from his hands, I ran down the steps onto the grass verge of the carriageway, sat down, put the massive bottle between my knees and started to open the thing. The pack howled around the last corner before Schloss Straight, adjusted trim and, just as the cork popped in a veritable fountain of champagne, their headlights splashed over the bottle—and bedlam ensued. All anchors were thrown out, the parade screeched to a halt and shadowy figures converged on me, to gleeful shouts of "Goody, goody the bubbly!" and such.

The carnage of the lawns and flower beds was over. After a few snorts there wasn't a soul who could remember how he was placed at the finish. Ruled "No Contest," but frightfully good fun, nonetheless. The evening was a fitting tribute to Herr Shtunke.

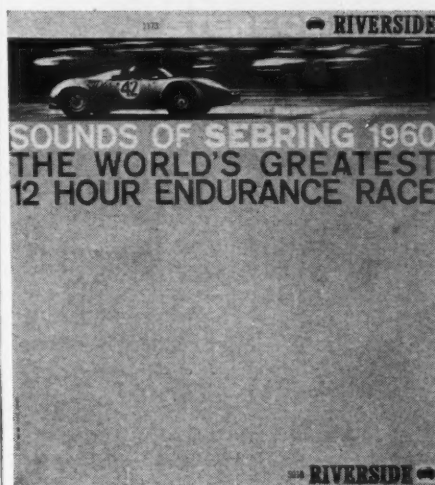
The following week each of the owners received a personal letter from Emil, in which he explained his desire to avoid a re-occurrence of the disaster—the death of his father, that is, not the havoc wreaked on Shtunke Schloss—and asked us to turn in our cars to the factory to be scrapped. He was extremely apologetic, but was sure that his father would have wished the matter settled this way. He would, of course, return the full purchase price, which was very decent of him.

One last pilgrimage back to the factory, one last gathering of the Shtunke Boys and it was all over. None of us wanted to be in at the finish, the scrapping.

It is rumored that one car, the best, was saved and now reposes in some ex-employee's barn or garage, but there has never been any concrete confirmation of this rumor. To the best of my knowledge all the Shtunkes are gone for good. That, of course, explains why you never see one around these days; I could see you were wondering about that.

—RP

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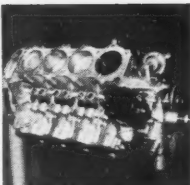
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## WEIGHT: ENGINEER'S ENEMY

Continued  
from page 45

Things look a little different in this light. For instance, high-strength steel is so much stronger than high-strength aluminum alloys that the difference in weight is more than compensated for—and steel parts could theoretically be just as light as aluminum in some applications. Note that high-strength magnesium alloys don't compare favorably with aluminum. Titanium looks very good on paper. Fiberglass is so-so on the "theory" scale—and note that plywood, if properly stressed, wouldn't be too bad as a monocoque body covering. (This used to be popular in the aircraft field, and Frank Costin has used it in a British prototype coupe.) And notice that glass is a pretty poor structural material any way you look at it.

But now we come to the "problems"—which is what we usually come to when we try to put slide rule theory into practice. The big bug, of course, is that not all the above materials are suitable for all applications in a car.

Take the problem of "fatigue". When a part is subjected to repeated stresses—like a wheel spindle—the usable working stress goes down, as compared with a part that has a constant, steady load. The stress that a material can carry virtually indefinitely under cyclical loading is called its "endurance limit". For most ferrous alloys the endurance limit is roughly  $\frac{1}{2}$  the ultimate strength, whereas for aluminum and magnesium alloys it is only  $\frac{1}{4}$  to  $\frac{1}{3}$  the ultimate strength. This means, in effect, that the relative strength/weight ratios of these light alloys will be reduced roughly 40 percent as compared with ferrous alloys for parts subjected to cyclical stress. This is why it wouldn't be too practical to use aluminum alloy for a wheel spindle.

Then there's the problem of brittleness and shock resistance. It has been found that the rate of stress application has an important influence on the fracture strength of materials. A sharp blow will fracture some metals and not others, though both may rate equal yield points. In general light alloys (aluminum, magnesium, titanium) have relatively low shock resistance as compared with iron, and nickel is way ahead of everything else in this department, so many basic metals can be improved by alloying with nickel.

And then, of course, there's always the old problem of costs. The designer of the high-production passenger car has to keep the cents-per-pound factor in mind at all times. Say he can buy conventional body sheet steel for 10¢ a pound; sheet aluminum would run him 35¢. Even if the aluminum body weighed 50 percent less his material would still cost him twice as much. And this is nothing. Super-strength vacuum-melt steels cost around \$1.50 a pound—and titanium alloys are running \$7.00 a pound at the mill these days! The designer must always balance benefits against cost; if we can't get John Q. to pay extra for a lighter car we'll just have to wait on technology that can build it for the same price.

The recent experience of the French Pan-

hard company might throw some light on this. You may recall the radical Type 54 they brought out in early 1954—practically an all aluminum car. The unit body was all-aluminum, even to the structural members in the floor, there being only a large steel tube cross-member to tie the front engine and drive assembly into the body. A two-cylinder air-cooled aluminum engine was mounted ahead of the wheels, in unit with an aluminum gearbox and final drive case. Curb weight was only 1530 pounds for the six-passenger version on a 101-inch wheelbase, and the price in France was \$2143. In 1956, due to manufacturing difficulties with aluminum, the company went to a steel body shell, retaining aluminum only for the doors and deck lids. This version weighed 1780 pounds, and cost \$1857. In other words, overall weight was 14 percent lower and cost 15 percent higher with the aluminum body shell.

## WHAT OF THE FUTURE?

Cars of all types in all parts of the world are going to get lighter in the years to come. It's an inevitable trend of progress (despite occasional detours, such as the last ten years in Detroit!). We have the materials and know-how right now to make big steps, but, as usual, progress must wait on "economic feasibility". Meanwhile there are a number of developments on the horizon that could do much to hasten the inevitable.

For instance, aluminum production requires enormous amounts of electric power. Imagine how the price of aluminum would drop if cheap atomic-generated power were available. Even at the current price of aluminum there are many instances where the production speed and dimensional accuracy achieved with die-casting are reducing the overall cost of aluminum parts below that of sand-cast ferrous equivalents that have to have a third of the metal machined off.

But perhaps the most significant development of all was announced only a short time ago by the small Research Development Corp. of America in Gardena, California. These people claim a big breakthrough in heat-treating techniques that yield ultimate tensile strength increases of 10 to 60 percent on various alloy steels—with an improvement in ductility! An independent testing company has tested some of their chrome-vanadium steel samples at 375,000 psi, with good ductility. Company officials are confident of approaching one million psi tensile strength by 1961! No details on the process are available, of course, but there is no doubt that we have a vital development here. The obvious end result: parts made of relatively inexpensive ferrous alloys, carrying working stresses two or three times as high as now, and weighing 30 percent less than the most advanced designs in aluminum parts!

So I can picture that future passenger car right now: all the castings (engine, transmission and final-drive case, fittings, etc.) will be die-cast aluminum—maybe even to cast wheel-brake units. The body will be a very thin steel shell over a highly-developed space frame of 500,000-psi alloy steel tubes. Highly-stressed internal parts like gears, springs, and shafts will be new alloy steels. And weight? For a given passenger and luggage accommodation it should weigh about one-half as much as a 1960 car.

—RH

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The Marquis de Portago with world champion Juan Manuel Fangio at the French Grand Prix.



Alfred Neubauer, Stirling Moss (right) and Denis Jenkinson after their 1955 Mille Miglia victory.

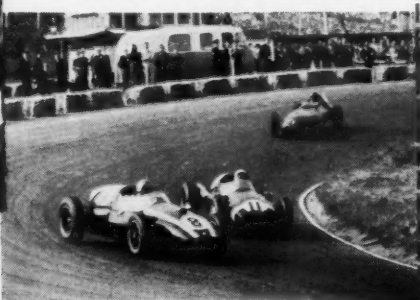


The Cooper team, left to right: Jack Brabham, Bruce McLaren, John Cooper.



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Moss (11) and Brabham (8) taking a corner at the Dutch G. P. Zandvoort



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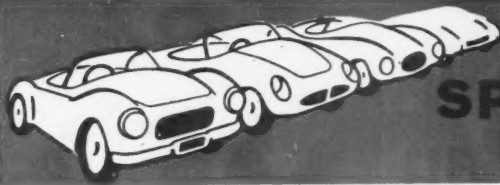
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# TECHNOTES

## COOLING PROBLEM

I have a 1958 250 bhp Chevrolet. At about 12,000 miles all of the freeze-out plugs began to leak and had to be replaced. When I bought the car I put soluble oil in the radiator to act as a rust inhibitor.

The manufacturer tells me that I have an electrolysis condition in the cooling system. Several mechanics I have talked to do not know what causes this condition. I would appreciate an explanation of it and any suggestions for preventing it.

Roy F. Hagemyer  
Garden Grove, California

Assuming the rust-inhibiting solution you used contained oxalic acid and the freeze-out plugs were cadmium or zinc plated, it's possible an electrolysis action could take place. The protective plating would then be gradually removed from the plugs and deposited elsewhere in the cooling system. This would remove about .002 inch from the plugs, making them a loose fit in the block and causing leaks.

The best cure is to flush the cooling system thoroughly twice a year to remove the rust and sediment and use only water or water mixed with a good quality anti-freeze when air temperature requires it.

## DETUNED CORVAIR

I have been considering replacing the dual carburetors on my 1960 Corvair with a single carb mounted over the fan and two extending manifolds. I believe this will greatly increase my gas mileage (primary reason for the conversion) but will also diminish power, speed and general performance.

Will this arrangement have any detrimental effect on the parts or life of the engine? What size carburetor should I use and is the car geared to perform adequately with reduced power?

Clifford V. Rowe  
Pomona, California

The installation you describe would require fabricating a new inlet manifold, revising the throttle linkages, fabricating a pre-heater to use exhaust heat to warm the inlet pipes and selecting a proper carburetor. It might be wise to use one of the single-venturi, twin-throat carburetors that were common on prewar Hudsons and several postwar cars. These had a pair of throttle butterflies and twin ports intended to provide better fuel distribution for in-line engines. Some V8 engines used a similar carburetor in the early 1950s.

Such an installation might provide up to 12 percent better gas mileage, but would cost far more than any saving on fuel bills in a year of normal driving. Efforts to increase mileage further by running too lean a mixture could easily result in burned valves. While the gearing of the Corvair would allow adequate performance with the resultant 10 percent decrease in engine

power, the tendency to drive harder in traffic would negate some of the economy gained by this conversion. The power loss would become more noticeable at speeds above 40 mph, particularly when passing other cars at highway speeds and climbing hills.

## FAR OUT ENGINE SWAP

Would a double-overhead-cam Coventry Climax engine fit in a 1959 Triumph TR-3?

If so, how much would it cost and how much modification would it take to install this engine?

Sidney C. Menge  
Fort Myers, Florida

While the twin-cam C-C engine could be installed in a TR-3, the cost would hardly justify it. A new Climax engine with accessories would cost close to \$1,500, if you could get one in less than six months. Added to this would be adaptors for the TR-3 gearbox, special front engine mounts, starter and generator, and such changes to the Triumph engine compartment and firewall as dictated by the engine configuration. Professionally done, the installation (including engine price) would cost more than a brand new TR-3. Doing it yourself might cut the cost below \$2,000 but not very much.

Assuming you have the 2.5 liter engine in mind, this would put the car in Class D modified for racing. Tuned for competition the 2.5 Climax should provide some 200 bhp in sports car form and extensive lightening might get the car down to 2000 pounds curb weight. This is competitive with some of the older Ferraris, but not with any of the recent Italian cars in the class. For street use the engine would be very fussy and lacking in low rpm performance.

## RAMBLER RIDE CONTROL

Please advise me what types and makes of shock absorbers are available for my 1953 Nash Rambler to make it ride better. I am considering buying a set of Koni shock absorbers but they are quite expensive. Would you recommend that I install Konis at the front only and use new stock units at the rear? What about the "Air Lifts" and "Coil Auxiliary" units that are being advertised?

Jack Siegel  
Bronx, New York

Installing Koni shock absorbers on your Rambler would give good ride control but at a premium price. A less expensive alternative is to use American-made dampers that are designed for this purpose. Traction Masters, Gabriel and Monroe make units that are suitable for your car and priced somewhat higher than stock replacements. In the New York area, Columbus 50/50 dampers are readily available and priced competitively. The lower cost of the domestic units would permit using them at all four wheels which gives better ride and handling than stiff shocks at one end only.

Air Lifts are not easily adaptable to the Rambler front coils and act mostly as a secondary spring. These and coil auxiliary units are a good choice, if you carry heavy passenger or baggage loads frequently. For a good ride control and handling with a normal load aboard (approx. 400 pounds) any of the above-mentioned shock absorbers or similar units will do the job.

## DOHC CROSLLEY

A few years ago a gentleman named Dr. J. P. Young built a double overhead cam version of the Crosley engine using patterns of his own design. He ran this engine in a special at West Coast Class H races. I believe the displacement was 30 cubic inches and a blower was used, moving it up from Class I to Class H.

I would like to locate either Dr. Young or the engine and/or the patterns.

Charles P. Craves  
Cannon A.F.B., New Mexico

No information concerning Dr. Young or his engine has become available to us. We will, however, forward to you copies of any material we receive from readers who may have more information concerning Dr. Young and his very interesting engine.

A similar approach was tried by Bandini several years ago and two or three of these engines were raced on the East Coast. As you know, the Crosley does not have a detachable head, the same casting being used for the cylinders, combustion chamber, cam box and water jacket. Apparently the Bandini people sawed away this casting at the top of the cylinder bores or duplicated this portion with a unit of their own design. A separate twin cam cylinder head was bolted to this having inlet and exhaust on opposite sides. The engine displaced 750 cc and no blower was used. The Crosley engine was very popular with Italian speed equipment manufacturers and a wide variety of good quality components were made to increase reliability at high rpm. The twin cam Bandini probably used these parts rather than stock Crosley items.

## SUPER SIMCA

In the March 1959 issue of SCI a Chevy-powered Simca was described in the Technotes section. I own a 1960 Simca Aronde four-door sedan. I would like to install a V8 engine and I wonder if you could give me some information on how to do it.

A/2c J. L. Westerman  
Port Isabel, Texas

In some cases, the simplest and most practical route to more performance from a given car is to install a larger engine. This is not always true and considerations of cost, practicality and utility of the end product must be carefully evaluated.

Replacing the Aronde engine with a Chevy V8 and gearbox would require reworking the motor mounts, firewall, floorboards and transmission tunnel, driveshaft and control linkages. A new exhaust system would be needed and possibly a new rear axle to handle the increased torque. There remains the question of whether the steering column will clear the left bank of cylinders and the matter of accessibility for servicing the engine after installation. The Chevy V8 measures 28" from the fan to the rear of the block, and about 26" across the outer extremities of the valve covers and at least 3 more inches all around are needed to get at things.

Some years ago a modified Ford V8/60 engine was installed in a Simca sedan with good results, so the Chevy installation is feasible. A less complicated alternative is to modify the Aronde engine with available speed equipment and possibly change the rear axle ratio to give either better acceleration or higher cruising speed.

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